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A Summary Report of the Table River Surveys 1996 Status Report

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ABSTRACT

This report summarizes the results of the 1996 field activities conducted in the Table River watershed, comparing it to data and results found in two 1995 status reports: A Reconnaissance Survey of the Table River, 1995 (Langston in prep.), and Fish Presence and Abundance Surveys of the Table River, 1995 (Zemlak and Langston in prep.). Surveys conducted in 1996 include Reconnaissance Level Stream Surveys, Level 1 Fish Habitat Assessments, electrofishing surveys, beach seining, and an underwater fish census. The entire mainstem river and 6 tributary streams were aerial video surveyed (110.2 km). Included within this report are maps showing significant stream features, attained by video analysis, as well as all stream survey and fish habitat assessment site locations. Fish sampling surveys were conducted to determine the distribution and relative abundance of the nine fish species/genera that were found to inhabit the Table River watershed. These surveys revealed that many of the fish populations have an uneven distribution within the watershed. An emphasis was placed on the study of the Table River Arctic grayling *(Thymallus arcticus)* population which is currently red listed in the Williston Reservoir watershed. A detailed study of the habitat utilization of adult/sub-adult Arctic grayling was undertaken. Electrofishing was conducted at 71 sites in the mainstem and tributaries, and stream surveys were undertaken at 38 of these sites. Fish Habitat Assessments were conducted throughout the watershed to identify fish habitats that have been impacted by forest harvest, British Columbia Railway development and/or natural processes. The need for the implementation of watershed restoration techniques was identified in a number of mainstem and tributary sites.

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INTRODUCTION

The Table River study is a co-operative research project co-funded by the Peace/Williston Fish & Wildlife Compensation Program and the Watershed Restoration Program (an initiative under the provincial Forest Renewal Plan). One of the goals of the Watershed Restoration Program (WRP) is to restore, protect, and maintain fisheries, aquatic, and forest resources that have been adversely impacted by forest-harvesting practices and that would require several decades to recover naturally.

The Table River watershed has been impacted by timber harvest, and railway and road construction, over the past 30 years. The watershed is inhabited by numerous fish species/genera, two of which are rare (bull trout, *Salvelinus confluentus)* and endangered (Arctic grayling, *Thymallus arcticus).* During the past two years, numerous surveys have been undertaken on the Table River to assess the present distribution and relative abundance of the Table River fish populations. This report will outline and discuss the results of field activities conducted in the summers of 1995 and 1996. The main objectives of these surveys were:

1. to summarize fish species/genera distribution and relative abundance within the Table River watershed, and to investigate their habitat requirements/preferences;

2. to identify existing limitations to the fish populations, including the identification of habitat degradation attributable to both natural processes and human activities that have occurred within the watershed (logging, road construction, railway construction); and

3. to prescribe management, mitigative, compensatory, and restoration plans to restore the productive capacity of the Table River fish resource.

The Table River supports a number of sport fish species such as rainbow trout *(Oncorhynchus mykiss),* bull trout, mountain whitefish *(Prosopium williamsoni},* and Arctic grayling. Arctic grayling populations within the Williston Reservoir watershed have suffered severe declines in recent years (Blackman 1995). Factors contributing to this decline are thought to be a combination of the effects of river impoundment (a result of damming the Peace River in 1968), environmental changes, and a rapidly growing sport fishery (Northcote 1993). Vincent (1962) cited "ease of capture and late maturity undoubtedly enable the removal of large numbers of individuals before maturity" as reasons for the decline of grayling from much of its historical range. In Alberta, Nelson and Paetz (1992) reported that larger adult Arctic grayling can be rapidly depleted even under moderate angling pressure. This finding is supported by a study conducted by Carl et al. (1992) on the Beaverlodge River.

Twenty-five streams in the Williston Reservoir watershed which were previously inhabited by good populations of Arctic grayling were recently surveyed by the

revealed that low numbers of Arctic grayling were found in only two of these streams in areas relatively inaccessible to the public. As a result of the apparent serious decline of this species, the Ministry of Environment, Lands and Parks (MELP) initiated protective measures in 1995 by instituting a catch and release regulation for Arctic grayling in the Williston Reservoir drainage. Arctic grayling populations within the Williston Reservoir watershed, which includes the Table River, are currently "Red Listed" (QS1), indicating that the species is critically imperiled because of extreme rarity or because of some factors making it vulnerable to extirpation or extinction (Anonymous, 1995).

Since PWFWCP was initiated in 1989, several small scale projects have been conducted by the Program within the Williston Reservior watershed to gain knowledge primarily about Arctic grayling distribution and abundance. Arctic grayling life history information within the watershed is still limited. Northcote (1993) compiled a literature review of grayling life history information, as well as management and enhancement options. This information summary, combined with knowledge gained through studying the Table River Arctic grayling population, will be necessary for the successful protection, management, and enhancement of this endangered species.

Bull trout, another fish species at risk inhabiting the Table River, has been identified by the B.C. Conservation Data Centre as "blue listed" (S3) indicating that the species is rare or uncommon, and may be susceptible to large-scale disturbances. Information gathered on the life history and distribution patterns of bull trout (especially juvenile stages) during the Table River study may be of benefit to future management and enhancement applications, both in the Table River watershed and in other B.C. watersheds.

Reconnaissance Level Stream Surveys and Level 1 Fish Habitat Assessments were conducted in the Table River watershed during the summers of 1995 and 1996, in conjunction with underwater snorkel surveys, beach seining, and adult/sub-adult Arctic grayling habitat preference surveys. The Table River study is the most detailed and complete survey of any system within the Williston watershed to date. The size and scope of the Table River study will increase in 1997. In cooperation with the Watershed Restoration Program (WRP), the PWFWCP initiated an Arctic grayling radio tracking study in the summer of 1996 to identify migration routes from overwintering habitats, to critical spawning areas in spring, and then to summer feeding areas. Also initiated in the summer of 1996 was an Arctic grayling genetics study to determine the presence of unique genetic stocks within the Williston Reservoir watershed that may exhibit behavioral differences. In 1997, a Riparian Assessment of the Table River watershed, as well as studies investigating the emergence and habitat requirements of Arctic grayling fry, are expected to commence.

Annual status reports on the Table River study will be generated summarizing the activities of each year. Results from 1995 have been summarized in two status reports entitled "Fish Species Presence and Abundance of the Table River 1995" (Zemlak and Langston in prep.), and "A Reconnaissance Survey of the Table River: 1995 Status

Report" (Langston in prep.). A final report will be produced following the completion of field activities (anticipated in 1998). Evaluation reports on the effectiveness of restoration techniques employed to improve the Table River fish resource will also be generated.

BACKGROUND

Study Area

The Table River watershed is located in British Columbia's central interior, approximately 100 km north of Prince George (Tig. 1). Tributary to the Parsnip River, the Table River has a length of 56 km, draining a watershed area of 50,600 ha. Approximately 75 km downstream of it's confluence with the Table River, the Parsnip River flows into the southern end of the Williston Reservoir which ultimately drains into the Peace River. The Table River drainage falls within the Central Interior Rocky Mountains Ecoregion and the Hart Range Ecosection (Blackman 1995). Situated in the Sub-Boreal Spruce biogeoclimatic zone and the SBSwk2 biogeoclimatic unit, this type of watershed typically receives 550 to 1915 mm of precipitation annually (MacKinnon et. al. 1990). A mean annual run-off (the amount of a watershed's annual precipitation that enters the river) of 800 mm was found by Anonymous (1984) to be representative of the catchment area for the Table River headwaters. The corresponding mean annual mean daily unit flow was reported to be 25.4 $L/s/km^2$ (Anonymous 1984).

No Environment Canada Water Survey Department flow data has been collected for the Table River, thus alternate estimates of discharge were investigated. Langston (in prep.) estimated the Table River minimum daily discharge rate to be approximately 0.7 to 1.8 m^3sec., and the mean daily discharge rate to be approximately 12.9 m^3/sec. These estimates may be low since a discharge of 9.3 m^3 sec (329 cfs) was recorded during low flow summer conditions (August 11, 1995) approximately 3 km upstream from the mouth. Maximum discharge estimates were made by the Water Management Branch of the Ministry of Environment, Lands and Parks based on data collected from the nearby Parsnip and Sukunka rivers. These discharge estimates for 1, 50 and 100 year recurrence intervals are presented in Table 1.

Table 1. Estimated maximum daily and maximum instantaneous daily flows for the Table River watershed. Taken from Langston (in prep.).

Recurrence Interval	Maximum Daily Flow (m^3sec^{-1})	Maximum Instantaneous Daily Flow (m^3sec^{-1})
1 Year	94.6	107.2
50 Years	155.1	175.7
100 Years	168.4	190.3

The Table River has an east to west aspect with the headwaters originating in the Misinchinka Ranges of the Rocky Mountains. The upper one third (18 km) of the river channel is frequently confined and occasionally entrenched, flowing through a narrow,

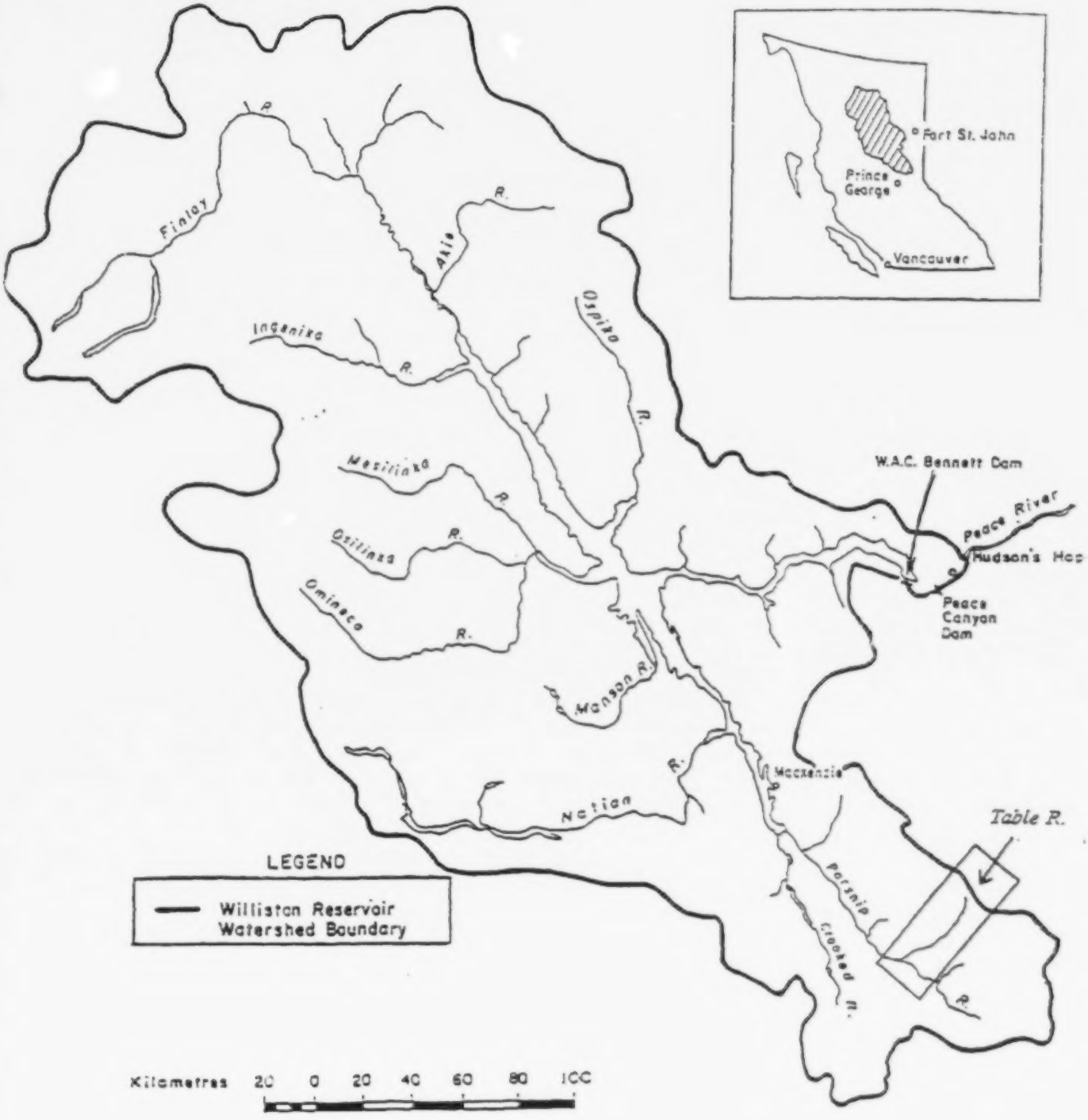


Figure 1. Location of the Williston Reservoir Watershed in British Columbia. Taken from Langston (in prep.).

steep-sided valley. Surficial substrate in the upper river area consists primarily of colluvial materials (Anonymous, 1984) and the streambed substrate is composed mainly of gravels and cobbles with the occasional bedrock outcropping. The lower two thirds (38 km) of the Table River is rarely confined, meandering through a one to two kilometre wide valley flat. Lacustrine materials make up the surficial substrate in this lower river area (Anonymous, 1984). Due to a near zero stream gradient in this section, and thus lowered stream flow velocities, long glide stretches and areas of sediment deposition are frequent. Closer to the river mouth, tortuous meanders, old oxbow lakes and abandoned channels are also common.

Logging History

Timber harvest has occurred for approximately 30 years within the Table River watershed. In general, logging has been limited to the lower two thirds of the river owing to the steep valley sides of the upper river. In the lower valley flat (13,600 ha total) approximately 30% (4,000 ha) has been harvested, equivalent to about 8% of the total watershed area of 50,600 ha (Blackman 1996). Approximately 40% of the stream length has been impacted by logging activities up to or in the riparian zone. Since 1990, little or no timber harvesting has taken place in the Table River watershed, and presently The Pas Lumber's activities are mainly silvicultural in nature.

Railroad History

From 1981 to 1983, British Columbia Railway (BCR) built an electric railroad from Tacheeda Lakes, along the entire length of the Table River, to Tumbler Ridge in order to service the Tumbler Ridge Coal Development Project. The rail line crosses numerous Table River tributaries as well as the mainstem itself, approximately 22.8 km upstream of the mouth. Near the headwaters, approximately 54 km upstream of the mouth, the railroad exits the watershed through a tunnel. A gravel road which closely follows the railroad to the tunnel is currently in use to facilitate railroad and tunnel maintenance.

Previous Habitat Studies

In 1977 the Resource Analysis Branch of the Ministry of Environment (Anonymous 1978b) carried out an aquatic resource inventory on the Table River, from the mouth (0 km) to approximately 38 km upstream, as part of an assessment for the development of the Northeast Coal Block. However, since the Table River was not considered as a site for development at that time, the assessment lacked detail, and the preliminary report provided very limited information on available fish habitat. Although no report specifically on the Table River was produced, the data gathered in 1977 is available on Department of Fisheries and Oceans, and Ministry of Environment stream

survey forms, and Aquatic Biophysical maps (scale 1:50,000), on file with the MELP, Prince George, B.C. A subsequent 1979 report by the B.C. Resource Analysis Branch identified the Table River as one of the most productive streams in the area immediately west of the Hart Ranges (Harding 1979).

METHODS

Mapping of the Table River

In September 1995 an aerial video survey was conducted by helicopter on 54 km of the Table River, as well as on six of the largest tributaries (56.2 km total length). The aerial identification of many stream attributes was provided by A.R. Langston (Registered Professional Biologist). Further analysis of the video, combined with information gathered from ground surveys led to the identification of mainstem river and tributary reach breaks (PWFWCP staff), areas of difficult fish passage, and sites of habitat degradation attributable to both natural and logging induced processes. Three maps have been included in this report to facilitate the identification of important stream feature locations, and the prioritization of future survey and restoration sites. The maps are National Topographic Service (NTS) maps of 1:50,000 scale (North American Datum 1927), although map features will be eventually plotted onto digitized 1:20,000 scale BC Geographic Systems (BCGS) map overlays. The three maps, in addition to reach break and kilometre mark locations, present the following information:

1. stream features such as debris jams, eroding banks, areas of extensive channel movement, flooding, and braiding, as well as areas of difficult fish passage (ie. falls, cascades, and beaver dams);

2. locations of all electrofishing and Reconnaissance Stream Survey sites surveyed on the Table River mainstem and tributaries in 1995 and 1996; and

3. locations of all Level 1 Fish Habitat Assessment sites surveyed on the Table River mainstem and tributaries in 1995 and 1996.

Water Temperatures

Water temperatures were recorded in the Table River and selected tributaries during the summer and fall of 1995 and 1996, by digital recording thermometers (Ryan Instruments TempMentor). The units, certified accurate to ± 0.3° C, were programmed to record water temperatures at two hour intervals from June 8 to October 15 in 1995, and from June 19 to November 6 in 1996. Thermographs were positioned so as to be widely distributed throughout the Table River watershed, with two placed in upper and lower locations on the mainstem, one positioned in an upper river tributary, another in a mid-river tributary, and the last in a lower river tributary.

- T1 - Lower Table River, at km 3.8 (adjacent riparian zone intact)
* - T2 - Tributary 293, at road crossing 0.8 km upstream from Table River (thermograph located on the upstream edge of a cutblock)
- T3 - Tributary 496, at road crossing 1.6 km upstream from Table River (adjacent riparian zone logged to stream bank)
- T4 - Tributary 610, at road crossing 1.0 km upstream from Table River (adjacent riparian zone logged to stream bank)
- T5 - Upper Table River, at km 35.5 (adjacent riparian zone largely intact)

* Water temperatures were monitored in this location in 1995 only.

Fish Sampling and Abundance Surveys (juveniles and adults)

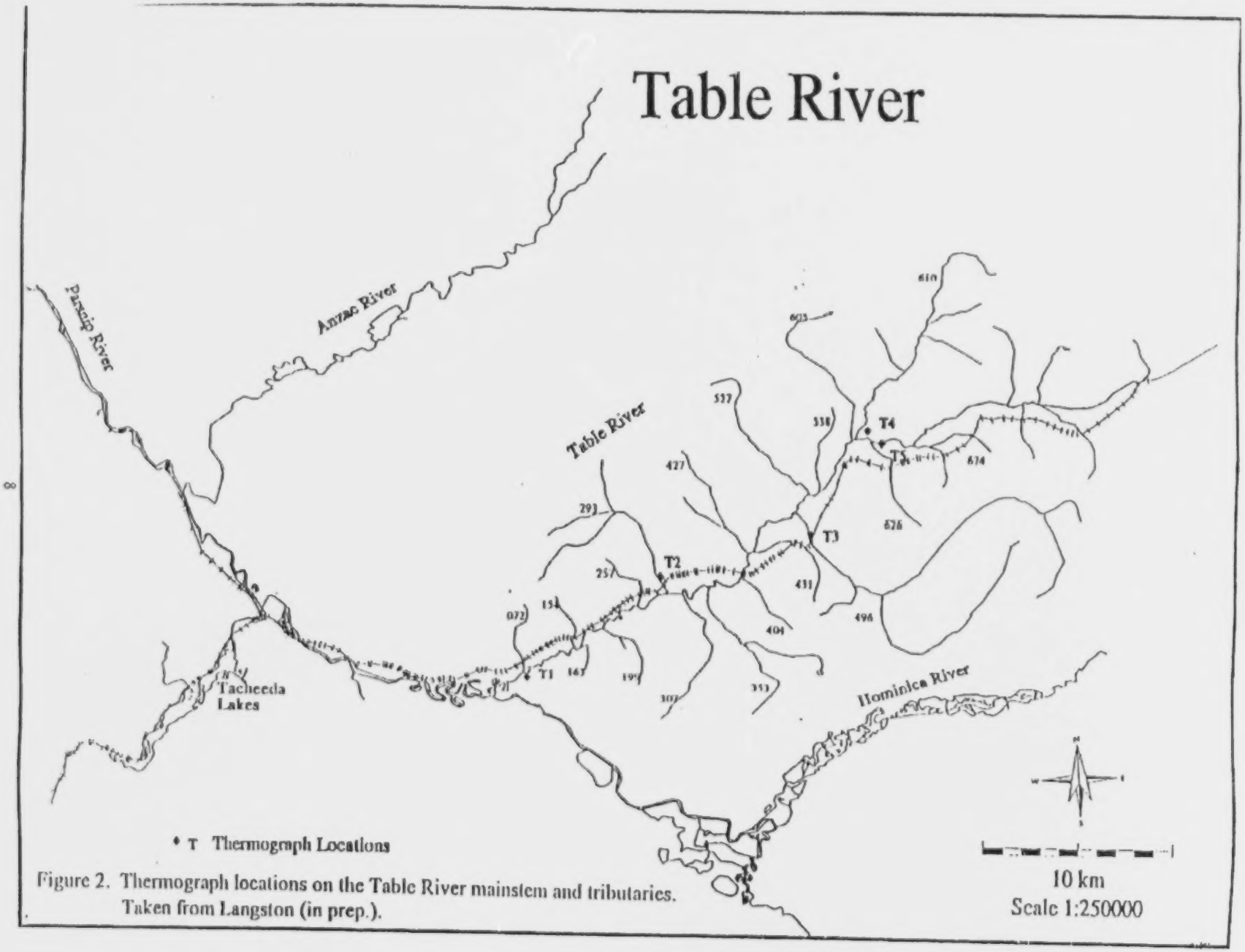
Juveniles

Electrofishing was used to capture and sample juvenile fish in the tributaries and the mainstem of the Table River. In the 1995 field season two methods of electrofishing were used:

1. to identify fish species/genera distribution (open site, single pass)
2. to determine sport fish density estimates (closed site, two or three pass)

The latter method involved using stop nets to prevent fish movement into or out of a section of stream (typically 440 m^2) while the section was electrofished two or three times (Zippen removal method). Fish population estimates (densities) were generated using the American Fisheries Society program Microfish 3.0 (Van Deventer and Platts 1985). In 1996, electrofishing was conducted in open sites primarily to determine the distribution of juvenile Arctic grayling.

Captured fish were anaesthetized with a solution of one Alka seltzer tablet dissolved in three litres of fresh water (Zemlak and Langston in prep.). Fork lengths were then measured on a smolt board to an accuracy of 1 mm and fish weights were measured on a digital balance to an accuracy of 0.1 g. Scale samples were taken for ageing purposes from all Arctic grayling as well as representative samples from rainbow trout and bull trout. Records were kept of fish mortalities, which were sampled in the same manner. Sampled live fish were then revived and returned to the stream. Fork length and weight data from the sampled fish are found in Zemlak and Langston (in prep.).



• T Thermograph Locations

Figure 2. Thermograph locations on the Table River mainstem and tributaries. Taken from Langston (in prep.).

Adults

In the 1995 and 1996 field seasons, single pass underwater fish counts were conducted in the Table River mainstem to determine the relative density of fish populations and their distribution within the Table River mainstem. The single pass survey in 1995 was conducted from km 35.5 to the mouth (km 0), over 5 non-consecutive days (July 6-7, 9, and 18-19). The 1996 single pass survey was conducted from km 37.6 to km 24.5, over 2 consecutive days (July 23-24). A five kilometre section (km 29 to 25) surveyed in 1996 was not surveyed in 1995 due to difficult access. The single pass underwater counts were conducted by two experienced swimmers equipped with dry suits, masks and snorkels. Mean wetted widths and visibilities (the limit of underwater visual observation) were measured in each kilometre section to allow for the expansion of fish counts where the river width was greater than the combined visual widths of the two swimmers. In 1996, several wetted widths were not recorded, and as a result, the widths were estimated for a 6 kilometre section (km 32-30, 29-26, and 25-24) using the aerial video record as well as air photos. The expanded values for these sections should be used with caution. Since each swimmer's lane was situated to encompass both the mid-channel and the near-shore zones of the river it was deemed unnecessary to stratify the expansion factors.

Arctic grayling, bull trout, mountain whitefish, and rainbow trout were enumerated by size category (0-10 cm, 10-20 cm, 20-30 cm, 30-40 cm, 40-50 cm, 50-60 cm, and 60-70 cm) (Zemlak and Langston in prep.). Northern squawfish *(Ptychocheilus oregonensis)* and suckers *(Catostomus* sp.) were only enumerated, with no size breakdown undertaken. Sculpins *(Cottus* sp.) were observed but enumeration and size breakdown were not recorded. Other species/genera of the Table River were not observed during the underwater surveys.

In 1995 a two pass underwater underwater count in conjunction with a Petersen mark-and-recapture survey was conducted in two subsections of the Table River mainstem, following the methodologies outlined in Slaney and Martin (1987). Length-at-age data were collected from Table River Arctic grayling caught in 1995 (while Floy tagging for the mark-and-recapture survey), and from Table River and Anzac River Arctic grayling caught in 1996 (during radio-tagging). T-tests ($\alpha \leq 0.05$) were performed on the length-at-age data to determine if significant growth rate differences (differences in length for the various age groups) exist between Arctic grayling caught in different river systems. Length-at-age data for 1996 Table River Arctic grayling were compared to 1996 Anzac River Arctic grayling. Length-at-age data from Arctic grayling in the Mesilinka, Nation and Parsnip rivers were compared to the Table River Arctic grayling caught in 1995.

Beach Seining

In the 1996 field season beach seining was conducted at 45 sites to capture fish, particularly sub-adult Arctic grayling (ie. 60-130 mm), in the shallow margins (ie. 5 cm to a maximum of 2 m) of the Table River mainstem where underwater fish counts were impractical. The seine net used was 30 m long and 2 m deep, having a stretched mesh size of approximately 1 cm. Floats were attached approximately every 0.5 m, to the top long edge of the net, and a lead line was joined to the bottom edge. At all sites, only one bank of the mainstem river was seined due to the broad width and usually considerable depth of the river.

Fish Habitat Assessment

The fish habitat assessment of the Table River watershed involved utilizing two main survey methods to fulfill many inter-related objectives. Reconnaissance Level Stream Surveys, as outlined in the Lake and Stream Inventory, Standards and Procedures (Draft), MELP 1995, were conducted:

1. to identify the presence, distribution and relative abundance of fish species/genera within the watershed; and
2. to classify sites based on biophysical data for interpretation of habitat sensitivity (impact assessment) and capability for fish production.

Parameters measured during these surveys were recorded on the Department of Fisheries and Oceans, and Ministry of Environment Stream Survey Forms (Appendix D).

The second type of survey initiated was a Level 1 Fish Habitat Assessment (FHA) as outlined in Johnson and Slaney (1996). As it appears that the productive capacity of the fisheries resources in the Table River watershed have been adversely impacted by past forest harvest practices (Blackman 1995, 1996), Level 1 Fish Habitat Assessments have been conducted:

1. to confirm/revise the identification of the nature, location, extent and severity of forest harvest impacts on fish habitat;
2. to provide sufficient information to identify and prioritize restoration options, and to identify initial project objectives and scope;
3. to identify the need for any Level 2 Fish Habitat Assessments; and
4. to prepare initial budgets and schedules for restoration projects.

As the FHA procedures manual was not available when the Level 1 FHA surveys commenced on the Table River, data collected in the field were recorded on a form designed by Program staff (Appendix D). During these assessments, a few habitat parameters that are now required for a Level 1 FHA, were not measured. These are as follows:

1. bankfull depth;
2. functional large woody debris (LWD) tally. Functional LWD are those pieces that influence channel geomorphology by causing scour or impoundment (only total LWD was measured);
3. disturbance indicators (ie. eroding banks, recent LWD jams, areas of extensive scour, unvegetated bar, and riffle zones, etc.);
4. instream vegetation; and
5. type and structure of the riparian vegetation.

Detailed field notes were usually taken regarding parameters #3-#4, and the absence of data on riparian vegetation is not overly significant since a complete Riparian Assessment of the Table River watershed is expected to commence in the summer of 1997.

In addition to the data collected using the two survey methods, several other aquatic biophysical parameters were measured as follows:

1. percent habitat area suitable for fry, parr and adult salmonids (recorded during the Level 1 FHA surveys); and
2. habitat preference of Arctic grayling (ie. water velocities, substrate and cover).

In preparation for the two types of surveys, the Table River mainstem was divided into kilometre sections starting at the mouth (0 km) and continuing upstream to the 55 km point. Using air photo interpolation and 1:50,000 scale NTS maps, along with known locations of tributary mouths (provided by the MELP's Watershed Dictionary), the kilometre points were established. Kilometre marker signs were posted at the river's edge at each kilometre from km 0 to km 36 to provide a location reference for field activities on the mainstem. Fish Habitat Assessment sites were selected so as to be well distributed within the watershed (mainstem and tributaries), although also based on proximity to access points. Hip chain was used to measure Level 1 FHA and stream survey site locations greater than 1 km on the mainstem river and a surveyor's tape was used to measure site lengths less than 1 km on tributaries and the mainstem. North American Datum (NAD) 27 Universal Transverse Mercator (UTM) coordinates were collected for each site surveyed on the mainstem and tributaries using a hand-held Trimble GPS unit. These coordinates were subsequently converted to NAD 83 UTM coordinates to allow for the eventual mapping of the sites onto 1:20,000 scale BCGS maps. Table River tributaries are referred to by the last three digits in their watershed code found in the MELP's Watershed Dictionary.

Arctic Grayling Habitat Preference

In addition to the collection of physical and biological information for the Reconaissance Level Stream Surveys and the Level 1 Fish Habitat Assessments, specific data was also gathered on the habitat utilization of Arctic grayling in 1995 and 1996 to

determine if certain types of habitat are being used preferentially by adult and sub-adult Arctic grayling. This information may be used to provide preliminary estimates of Arctic grayling productivity and to indicate if a habitat type is limiting Arctic grayling production in the Table River watershed. In the 1995 field season, special underwater counts of Arctic grayling were conducted by a swimmer equipped with snorkel gear. When an Arctic grayling was observed, habitat parameter measurements were taken at the exact location where the fish was positioned. The habitat measurements included:

1) habitat type;
2) water depth;
3) dominant and subdominant substrate types; and
4) water velocities.

In the 1996 field season, the underwater snorkel counts of Arctic grayling were conducted during the Level 1 Fish Habitat Assessments (Appendix D). The habitat parameters measured were expanded to also include:

5) primary cover;
6) distance of the fish from LWD;
7) channel, wetted and thalweg widths;
8) distance of the fish from the left bank;
9) fork length; and
10) the presence (and fork lengths) of other fish species/genera in the near vicinity.

Water current velocities were measured at three depths in the exact location the Arctic grayling was located using a Marsh McBurney current meter in 1995, and a Swoffer Instruments Inc. Model 2100 Series current meter in 1996. In 1995, velocities were measured at the fish depth (typically 10 cm off the bottom), at the 60% point in the water column (mean water velocity), and at the surface. In 1996, velocities were measured at the fish depth, on the stream bottom, and at the surface. Also measured was the highest velocity found in the cross-section of the habitat unit that the fish was found in.

RESULTS AND DISCUSSION

Mapping of the Table River

The aerial video survey conducted in September 1995 covered 54 km of the Table River mainstem (total length is approximately 56 km) as well as a total of 56.2 km of six tributary streams. Use of the video record combined with ground surveys allowed the subdivision of the Table River mainstem and nine tributaries into representative reaches based on the homogeneity of stream characteristics such as discharge, gradient, channel morphology, channel confinement, and streambed and bank materials (Johnston and

Slaney 1996). Seven reach breaks were identified on the Table River mainstem and a total of 21 reach breaks were established on nine tributaries (Fig. 3).

Table River Mainstem Reach Breaks

Descriptions of the seven Table River mainstem reaches, and their locations are as follows. Note that the wetted widths given were visually estimated from a helicopter in September 1995.

Reach #1

Reach #1 (km 0-9.1) is a slow moving, unconfined section of river that meanders irregularly, and often torturously, through a 1-2 km wide valley flat. The wetted width is typically 35 m and the channel width ranges from 45-100 m. Channel movement, as well as oxbow lake and side channel formation in this section are common. Streambed and bank materials consist primarily of gravels and fines with some cobble. The dominant habitat type encountered is glide with limited riffle sections. Riparian vegetation along this reach consists of spruce and cottonwood. Tributaries 072 and 154 flow into the mainstem within reach #1. Dominant stream features noted within reach #1 were 5 major areas of flooding, channel braiding and movement, 3 debris jams and 1 area of bank erosion.

Reach #2

Reach #2 (km 9.1-26.7) is also a slow moving, unconfined section of river that generally meanders irregularly through the low gradient valley bottom, although there are several straight sections of about 1 km in length. The wetted width and channel width in this area ranges from 25-35 m and 50-70 m, respectively. The predominant streambed substrate is cobble and gravel, with fines ranging from 10-20%. Some boulders appear in the stream towards the top of the reach. The dominant habitat types encountered are primarily glides with some riffles. Debris jams have resulted in considerable channel movement and some braiding, avulsions, and the formation of large swampy areas. Sections of this reach are clearcut to the banks for up to several kilometres at a time, and natural bank instability is aggravated in many areas as a result. Bank stability increases in areas of increased riparian forest cover. Many tributaries flow into the Table River mainstem within reach #2 (431, 427, 404, 353, 307, 293, 257, 199, and 163). Beaver activity has blocked many of these tributaries close to their confluence with the mainstem. Major stream features noted within reach #2 include 2 large areas of flooding, braiding and channel movement, 8 debris jams, and 1 major area of bank erosion.

Reach #3

The river in reach #3 (km 26.7-34.9) meanders unconfined to occasionally confined with a wetted width of 20-28 m, and a channel width of typically 30-40 m, but up to 100 m in one flood plain area. Cobble, and to a lesser extent gravel, is the dominant substrate, with fines and boulders reaching up to 30% in areas. The primary habitat type exhibited is glide (approximately 80%), with some riffle sections (20%). Significant amounts of LWD is present at river bends, perhaps originating at a large debris jam that diverts the channel at approximately km 24.6. Beaver dams are common near the mouths of entering tributaries, which occasionally result in the mainstem channel braiding out into

large, low-lying swampy areas. The mouths of tributaries 527, 528 and 549 are obscured by such a swampy area. Eroding banks are also common, occurring both naturally and where the cut block extends to the river bank. Near the top of the reach, Tributary 610 enters the Table River with a discharge that appears to be comparable to that of the mainstem itself (upstream from the confluence). Other major tributaries flowing into this reach include 496 (Boulder Creek), Tributary 605, as well as the smaller Tributary 538. Major stream features in this reach include 2 main areas of flooding, braiding, and channel movement, 4 debris jams, and 2 areas of bank erosion.

Reach #4

In reach #4, (km 34.9-41.8), the river channel meanders primarily unconfined, although occasionally confined in two areas. Wetted width is typically 12-15 m and the channel width ranges from 25-45 m. Riffle habitat predominates the lower part of the reach, with glides becoming more apparent towards the upper portion of the reach. Near the middle of the reach, the stream channel becomes entrenched in bedrock and runs through a series of cascades and a set of falls of approximately 2.0 m in height, which is an area of difficult fish passage. Aside from this bedrock area, the streambed substrate consists mainly of cobbles and gravels, increasing in size towards the upper end of the reach. Bank stability is generally good although there are two large failed sections near kilometres 37 and 40. Cut block sections exist on both sides of the channel in this reach, although a narrow riparian strip of spruce exists along the immediate banks. Tributaries 626 and 674 enter the mainstem within reach #4. Significant stream features noted within this reach include 1 main area of flooding, braiding, and channel movement, 3 areas of falls/cascades, and 3 sections of bank erosion. Although major debris jams are absent in this reach, at least 14 separate debris accumulations, which may or may not be persistent during high flows, were noted from video analysis.

Reach #5

The river channel in reach #5 (km 41.8-43.2) has both sinuous and straight sections and is frequently confined through an area of increased gradient. The wetted and channel widths are generally equal throughout the reach, ranging from 14-15 m. The streambed substrate is primarily cobble, with some bedrock, and with large boulders making up 10-20%. The primary habitat types encountered in this reach are riffles and cascades. Near the middle of the reach, at km 42.7, a series of cascades, including a 1.5 m high waterfall, creates an area of difficult fish passage. Bank stability in this section is good due to the high boulder and bedrock content. No major tributaries enter the mainstem within this reach.

Reach #6

In reach #6 (km 43.2-50.9), the river channel begins to meander, occasionally confined across a wider valley bottom, although becoming more confined towards the top of the reach as the valley bottom narrows. The wetted width of this section is 10-15 m and the channel width ranges from 14-25 m. The streambed substrate is mainly cobble which increases in size towards the top of the reach. The stream gradient is lower than that of reach #5 and the habitat consists mainly of riffle, with some glide sections. Two

Figure 3. Locations of significant stream features on the Table River mainstem and six tributaries (353, 496, 527, 605, 610, and 626). Tributaries are referred to by the last 3 digits in their Watershed Code.

areas near the middle of the reach exhibit considerable bank erosion. In addition, there is an increase in beaver activity towards the upper end of the reach causing at least 3 large swampy areas, channel movement and braiding, and potential obstructions to fish passage. One beaver dam of approximately 1 m in height stretches from one stream bank to the other. Swampy, flooded areas are linked by stretches of river consisting of about 80% riffle and 20% glide habitat.

Reach #7

The lower section of reach #7 (km 50.9-54) is entrenched, with large boulder substrate, exhibiting fairly fast flow through 2 cascade/chute areas. Proceeding upstream, the stream gradient decreases and the channel opens into a swampy area created by beaver dams that appear to be impassable to fish. The stream channel then becomes occasionally confined, with large and small cobble substrate. Wetted width ranges from 6-10 m and channel width is 7-12 m. Habitat consists of about 80% riffle and 20% glide, with very few pools, except at river bends due to debris accumulation. There are a series of old beaver dams in this area which have been breached over time. Further upstream, the stream gradient and channel confinement increase again. Primary habitats become cascades, chutes, and riffles, over substrate of increasing size upstream, typically 30% boulder, 30-40% cobble, and 30% gravel with some bedrock present. The riparian vegetation consists of mainly spruce, and bank stability is good except for 2 large natural failed areas that slough clay and fines. No major tributaries enter the mainstem within this reach.

Table River Tributary Reach Breaks

Six Table River tributaries were aerial video surveyed and subsequently divided into reaches (Fig. 3). The tributaries were surveyed proceeding upstream until an obstruction to fish passage was encountered (i.e. large waterfall, high gradient chutes/cascades) thus the uppermost reaches may not described. The descriptions of the tributaries are as follows:

Tributary 353

Reach #1 is a meandering, unconfined section of stream having a wetted width of 6-10 m, and a channel width of 13-24 m. The streambed substrate is comprised of gravel and cobble, with some fines. The primary habitat type in this reach is riffle (approximately 90%). A large clearcut is located along most of the reach length, and bank stability is low in this area as a result. Some areas of side channel exist, and some cover is provided by LWD in the stream.

. Upstream of reach #1, the creek flows through an area of increased gradient, entrenched in steep rock banks. Bed substrate is comprised mainly of bedrock and boulder. Dominant habitat consists mainly of cascades and chutes. The creek enters a canyon in this area, where a set of falls, 2 m in height, is a barrier to the upstream passage of fish.

Tributary 496

The stream in reach #1 has a wetted width of about 15 m and a channel width of approximately 50 m. This is a low gradient reach exhibiting channel movement and braiding. Dominant streambed substrate is gravel, followed by small cobble and fines. Primary habitat types in this reach are riffles and glides. Limited cover is provided by LWD in some pools. One eroding bank comprised mainly of glacial till and clay is present in this reach.

The stream in reach #2 has a wetted width of 6-9 m and a channel width ranging from 6-20 m. There are many cascade/chute sections, as well as 2 sets of falls of 1-2 m in height, through the higher gradient, entrenched sections of this reach. Streambed substrate is mainly cobble with a substantial amount of bedrock and boulder. Two areas of bank failure exist in this reach.

The stream in reach #3 has a wetted width of 6-10 m and a channel width of 10-15 m. The stream gradient is low in this reach, where the channel is relatively straight at the downstream end, but meanders regularly in the upper section. Primary bed materials consist of cobble and gravel, with about 15% boulder and bedrock. The main habitat types in this reach are riffles and glides. Some fish cover is provided in pools associated with small debris jams located at the bends in meandering sections.

The wetted and channel widths in reach *#4* were similar for much of the reach, ranging from 6-10 m. Bed materials are primarily gravel and cobble with some bedrock and boulder. Habitat type in reach #4 is primarily riffle.

The channel in reach #5 is entrenched, having an equal wetted and channel width of approximately 8 m. The increasing gradient gives rise to many sections of cascades and chutes, as well as falls, which appear to be impassible to fish. The streambed substrate consists of about 50% bedrock, 40% boulder, and 10% cobble.

Tributary 527

Reach #1 is a low gradient section of river with mainly riffle habitat, that flows through a mature spruce forest. The wetted width is typically 5-6 m and the channel width is about 12m. Bed material consists mainly of cobble, followed by gravel. Most cover in this reach is provided by boulder, although a few pools created by LWD are present. Two areas of natural bank erosion, as well as some bars, are present in this reach.

The stream in reach *#2* becomes entrenched as the gradient increases, and habitat changes from riffle to mainly cascade. The wetted and channel widths are only 2 m in areas, and bedrock and boulder predominate the bed substrate. As the gradient continues to increase over the reach, the channel becomes impassible to fish through areas of entrenched cascades.

Tributary 605

Reach #1 meanders occasionally confined through a low gradient area. Wetted width is typically 6-7 m and channel width is approximately 12-14 m. The forest along this stream reach has been harvested up to, and along one bank for 1-1.5 km. Habitat consists mainly of riffle with a few glide sections and some small isolated pools associated with LWD cover. Bed material is predominantly cobble and gravel with some boulder. Some overstream vegetation cover is provided by willow and alder. Notable features in

this reach are areas of natural bank erosion, evidence of channel movement, and a small swampy area near the top of the reach.

The stream in reach #2 is frequently confined, although entrenched in areas. Wetted width is approximately 4-5 m and channel width is about 5-7 m. Cobble is the predominant substrate, followed by gravel, although there are sections of high boulder and bedrock content. The primary habitat type is riffle, although occasional sections of cascades and chutes create areas of difficult fish passage. Towards the upper end of the reach the stream depth becomes increasingly shallow as the gradient increases. Upstream of reach #2, the outlet of a small headwater lake flows into the mainstem of Tributary 605.

Tributary 610

The stream in reach #1 is occasionally confined and meanders extensively, and sometimes torturously. The riparian vegetation along the downstream half of this reach has been logged to the bank on both sides. The channel through this area braids occasionally, and contains a lot of LWD. The wetted width is approximately 10 m and the channel width ranges from 14-20 m. Bed substrate is predominantly cobble and gravel, with an increase in fines at the lower end of the reach. Habitat consists mainly of riffle and glide sections, with the presence of some small pools at sharp bends. Bank instability is high in this reach, with one major area of natural bank failure, and numerous areas of logging-related bank erosion.

Reach #2 is characterized by increased gradient and channel confinement, giving rise to sections of cascades, chutes, and falls. Bed materials consist of cobble and gravel in lower gradient areas, with increased amounts of bedrock and boulder in higher gradient areas. Several sets of chutes/falls are present in this reach, possibly obstructing or preventing fish passage upstream. One set of falls in particular has been identified as a barrier to fish passage.

The stream in reach #3 meanders mainly unconfined through a low gradient valley flat. Wetted width in this area is about 8 m and channel width is approximately 20 m. Bed material is primarily cobble and gravel, with some boulder and fines. The primary habitat type encountered is riffle, although areas of swamp are present. Side channel formation due to beavers, channel braiding, and oxbow lake formation are also common in this reach.

The tributary in reach #4 has a wetted width of 6-8 m and a channel width of 9-10 m. This section is characterized by increasing gradient, and channel entrenchment results in cascade habitat which is likely not passable by fish. The streambed substrate is made up of roughly equal amounts of boulder, cobble, and gravel, with bedrock and boulder becoming dominant towards the upstream end of the reach.

Tributary 626

The lower part of reach #1 meanders unconfined, and heavily overgrown, through a dense spruce stand. The stream then flows through a large cutblock, which extends down to the stream banks on both sides. The wetted width is approximately 4-10 m and the channel width ranges from 5-10 m. Cobble, gravel and some fines predominate a primarily riffle habitat in this reach.

Upstream of reach #1 the stream has a section of cascades and chutes, then continues to run unconfined through the cutblock. Wetted width is 5-6 m and channel

width is typically 7 m. Bed substrate consists mainly of boulder and large cobble, and the stream banks are fairly stable due to a high bedrock content. A road crossing culvert is located approximately 210 m upstream of the tributary mouth followed by a railroad crossing culvert located an additional 230 m upstream, which is presently impassable to fish. An impassable set of falls (approximately 3 m in height) is located 20 m upstream of the railroad culvert. Above these falls, the stream habitat continues to be mainly riffle with occasional cascades and chutes.

Water Temperatures

Water temperature data recorded at the four monitoring sites in 1996 are summarized in Table 2, and are shown graphically in Figure 4 (mean monthly temperatures), and in Figure 6 (mean daily temperatures). For comparison, mean monthly water temperatures for 1995 are shown in Figure 5, and mean daily water temperatures are shown in Figure 7. It is important to note that the mean monthly water temperatures for June and November 1996 were calculated from only 12 and 6 days of data, respectively (Fig. 4). The mean monthly water temperature for Tributary 496 in September 1995 was calculated from only the first 15 days of the month (Fig. 5). Figure 6 shows only temperatures recorded from July 1 to November 6, 1996.

Table 2. Mean monthly water temperatures in the Table River watershed by survey duration and month for 1996.

Location	June 19 - November 6	June	July	August	September	October	November
Upper Table River	6.2	5.4	7.6	9.1	6.5	3.1	0.3
Tributary 610	6.0	5.3	6.9	9.0	6.6	3.1	0.2
Tributary 496	6.4	5.1	8.3	9.9	6.6	2.8	0.1
Lower Table River	7.4	6.6	9.4	11.3	7.5	3.4	0.4

The mean water temperature at the upper Table River site was 1.2°C cooler than that at the lower Table River site from June 19 to November 6, 1996. In 1995, the upper section of the Table River was an average of 1.7°C cooler than the lower section over the survey duration (June 8 to October 15).

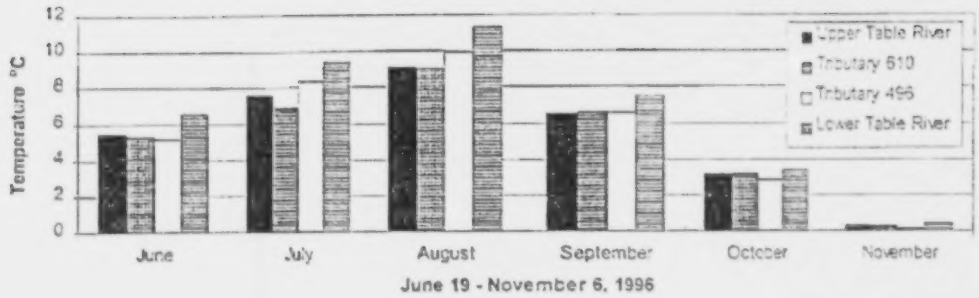


Figure 4. Comparison of 1996 mean monthly temperatures by month for the 4 thermograph locations in the Table River watershed.

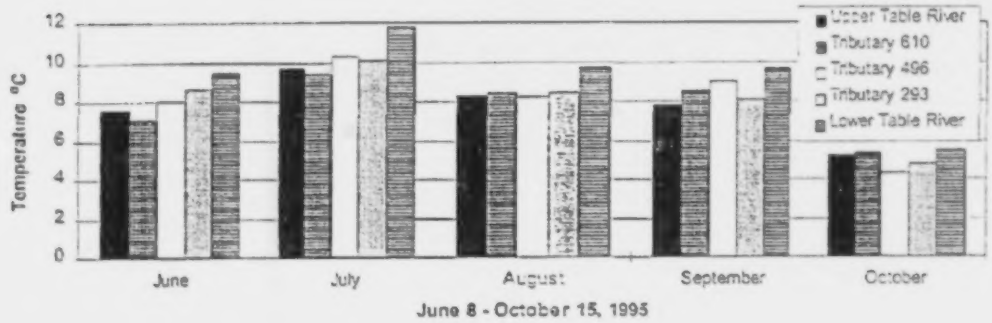


Figure 5. Comparison of 1995 mean monthly temperatures for the 5 thermograph locationsin the Table River watershed. Taken from Langston (in prep.).

Water temperatures in the Table River system are quite cold, even in summer, rarely rising above 10°C except in the lower mainstem. In both 1995 and 1996, the lower Table River was typically 1.5°C warmer than any other area of the Table River watershed. In 1996, mean monthly water temperatures recorded throughout the watershed were in general 1.5-2.0°C colder than those measured in 1995. These trends can also be noted for mean daily water temperatures in the Table River (Fig. 6 and 7). In 1995, peak water temperatures typically occurred in early July and then again in late July. In 1996, the highest water temperatures occurred slightly later, generally in early August, mid-August, and in early September.

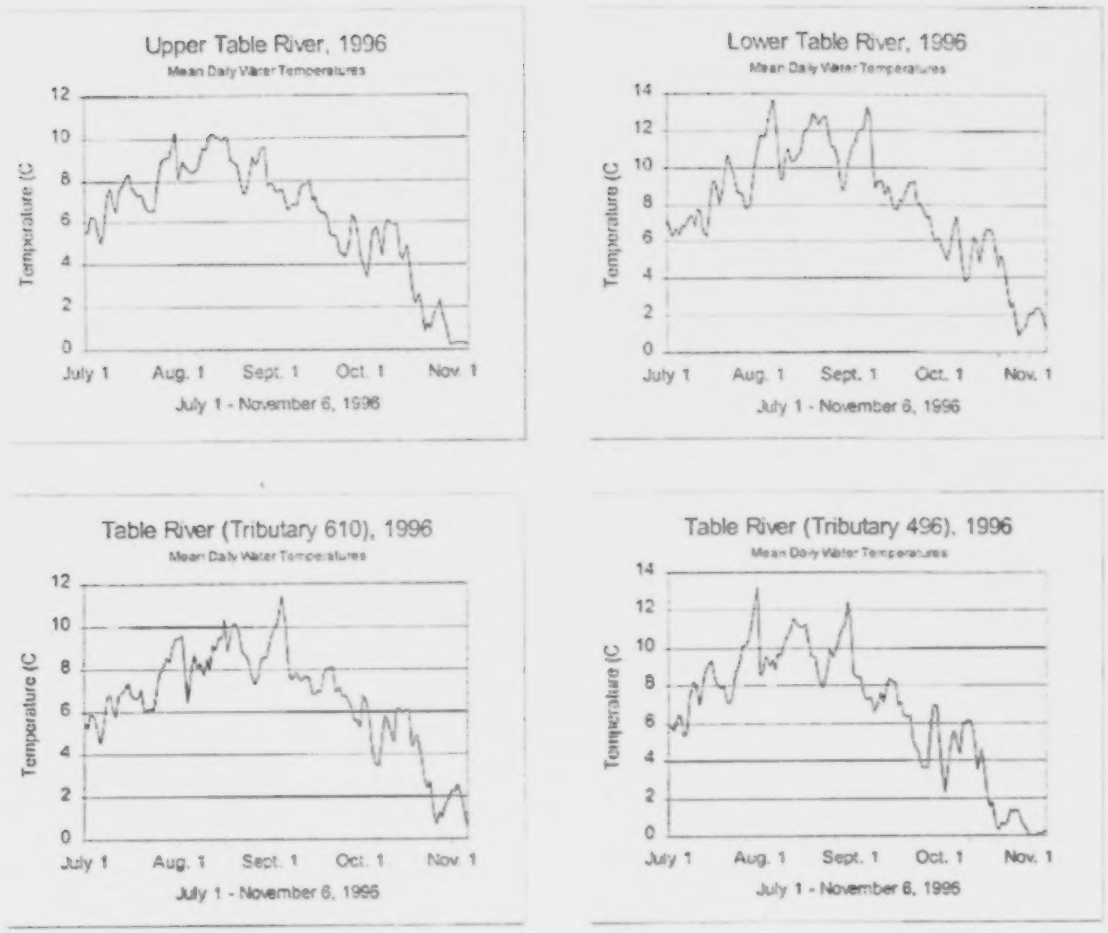


Figure 6. Mean daily water temperatures measured in 1996 at the four thermograph locations on the Table River mainstem and tributaries (T1, T3-T5, see Fig. 2) from July 1 to November 6.

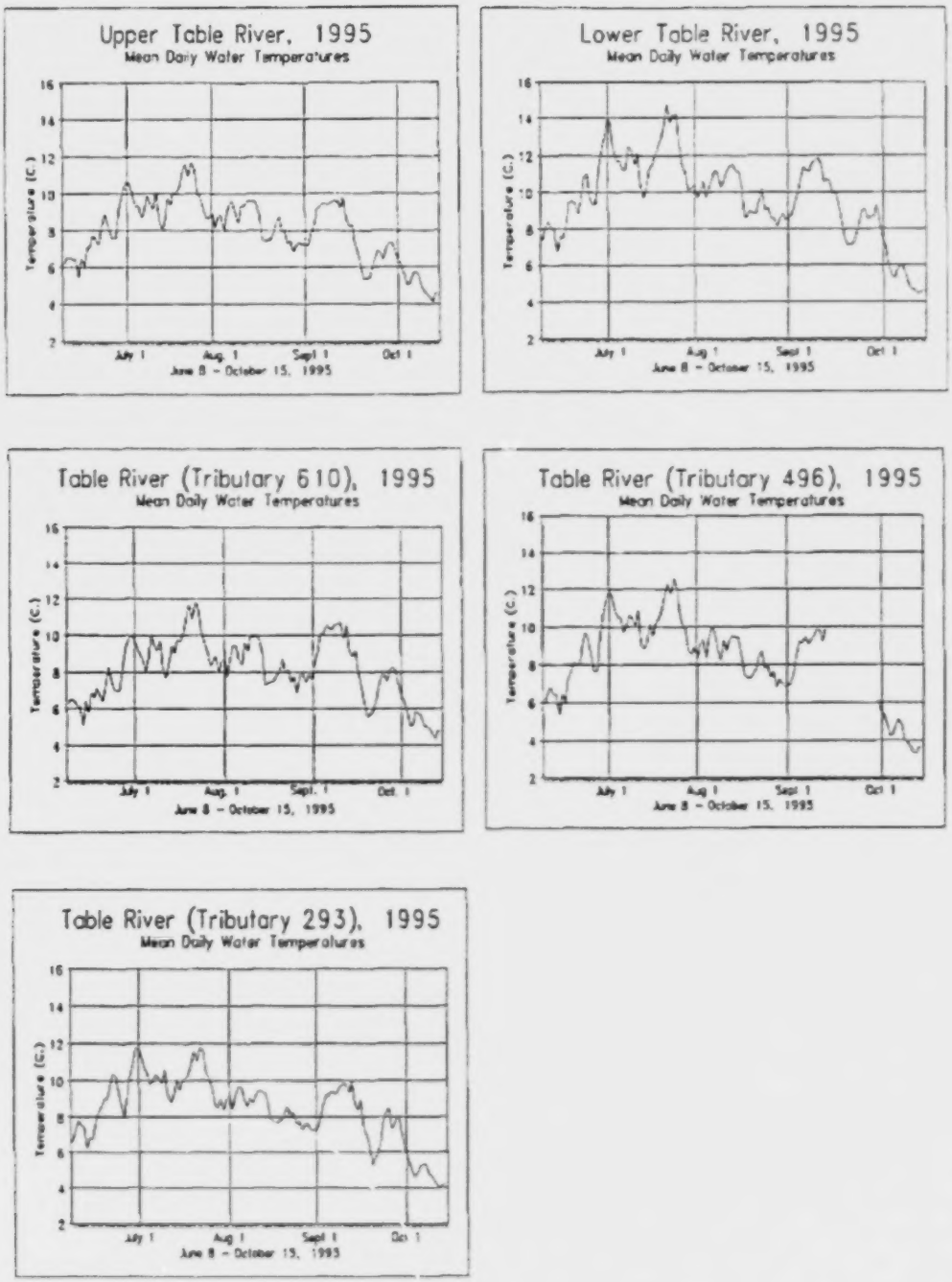


Figure 7. Mean daily water temperatures measured in 1995 at the five thermograph locations on the Table River mainstem and tributaries (T1 - T5, see Fig. 2) from June 8 to October 15. Taken from Langston (in prep.).

Fish Species of the Table River

Nine fish species/genera have been observed in the Table River watershed. They include: Arctic grayling, bull trout, burbot *(Lota lota)*, dace *(Rhinichthys* sp.) mountain whitefish, northern squawfish, rainbow trout, sculpins, and suckers.

Although the dace, sculpins, and suckers encountered in the Table River were not identified to the species level, species that inhabit the Parsnip River include longnose dace *(Rhinichthys cataractae)*, slimy sculpins *(Cottus cognatus)*, prickly sculpins *(Cottus asper)*, largescale suckers *(Catostomus macrocheilus)*, longnose suckers *(Catostomus catostomus)*, and white suckers *(Catostomus commersoni)* (Anonymous 1978a). It is likely that the dace, sculpins, and suckers observed in the Table River are of the same species found in the Parsnip River.

The Table River fish species/genera have an uneven distribution throughout the watershed. A 2.0 m high vertical waterfall is present at km 37.6 on the mainstem. Mountain whitefish, rainbow trout, and sculpins were found distributed throughout the mainstem and most of the surveyed tributaries below the falls. Only bull trout and sculpins were found upstream of the waterfall. It is unknown how or when the sculpin population became established above the falls. A series of cascades and chutes, including a 1.0 m high waterfall, located at km 42.7 on the mainstem, is a second area of difficult fish passage. Only bull trout were observed above this obstruction indicating that they are able to successfully migrate past both sets of falls/cascades. Arctic grayling were never observed in tributaries and were found only within the mainstem of the Table River below the first set of falls. Suckers were most abundant in the lower 20 kilometres of the river and the associated tributaries. Burbot, dace, and northern squawfish were observed too infrequently to adequately define their distribution.

Species Distribution and Abundance (juveniles and adults)

Juveniles

Electrofishing Results - Presence/absence

In 1995, 12 sites were electrofished on the Table River mainstem, and 24 sites were electrofished on 15 of the Table River tributaries from July 10 to September 29. The majority of electrofishing effort was conducted on the tributaries (25,610 m^2), as compared to the mainstem (15,518 m^2). Fish catch data collected at the 1995 electrofishing sites is presented in Table 3a. Five mainstem and 21 tributary sites have related stream survey information (Table 3a). One site on Tributary 293 (site #23, Table 3a) was surveyed but not electrofished. The location of each site within the watershed is shown in Figure 8.

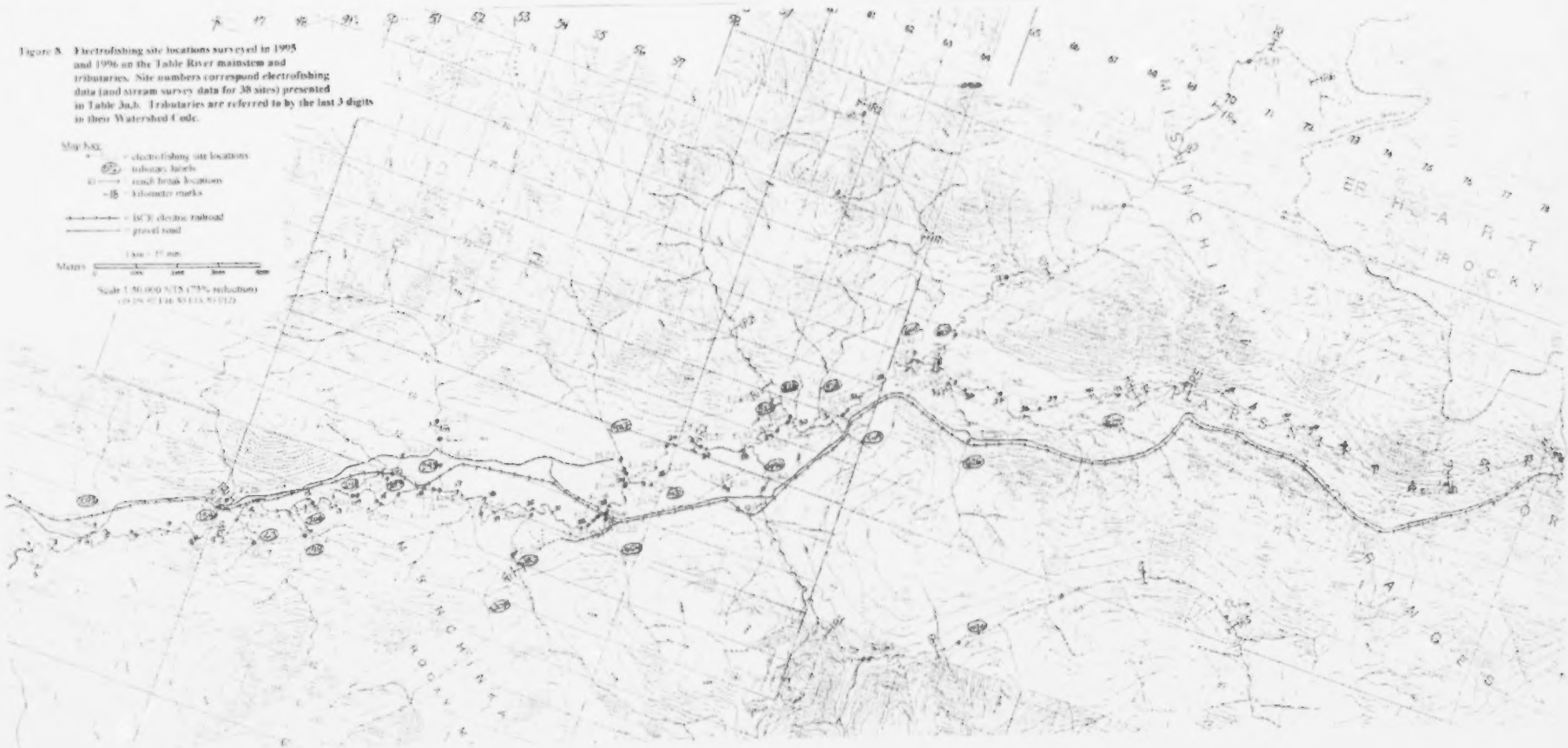


Figure 8. Electrofishing site locations surveyed in 1995 and 1996 on the Table River mainstem and tributaries. Site numbers correspond electrofishing data (and stream survey data for 38 sites) presented in Table 3a,b. Tributaries are referred to by the last 3 digits in their Watershed 4 code.

Table 3a. Table River mainstem and tributary electrofishing sites combined with stream survey site data collected in 1995. Site locations are shown on Figure 8.

						ELECTROSHOCKING DATA							STREAM SURVEY DATA												
E.L. site # (on map)	Location	Reach #	Video	NAD 83 U.T.M. coordinate	Total stream length (m)	E.L. date (y/m/d)	S.A. E.L. (m²)	Fish Captured species	# fish	mean F.L. (mm)	mean wt (g)	Water temp (°C)	Date surveyed (y/m/d)	S.A. surveyed (m²)	Avg w.w. (m)	Avg c.w. (m)	Stream gradient (%)	Area of pool (m²)	glide (m²)	riffle (m²)	Mean D-90 (cm)	Substrate fines (%)	gravels (%)	larges (%)	Stream discharge (m³/s)
1	Mainstem (3.8 km)	1	Y	10 547021 6063110	56,566	95/09/09	272	RB	1	36.0	0.6		n/a												
								BB	1																
								CC	9																
								MW	1	65.0	1.2														
								SU	1																
2	Mainstem (9.8 km)	2	Y	10 550411 6064960	56,566	95/09/10	150	CC	8				n/a												
3	Mainstem (11-17 km)	2	Y	10 552951 6066410	56,566	95/08/26	2,750	RB 0+	2	33.0	0.9		n/a												
								RB	2	126.0	22.9														
								MW	6	90.0	13.0														
4	Mainstem (15-16 km)	2	Y	10 553951 6068870	56,566	95/09/29	320	MW	3	50.0		8.0	95/09/14	23,381	26.5	43.0	0.0	3,881	10,718	8,782	15.8	10	40	50	
5	Mainstem (22.6 km)	2	Y	10 556821 6068129	56,566	95/09/20	50	CC	12				n/a												
6	Mainstem (22.8 km)	2	Y	10 556821 6068309	56,566	95/09/12	600	BB	2			10.5	n/a												
								CC	26																
7	Mainstem (26-27 km)	2-3	Y	10 560121 6070498	56,566	95/09/26	5,112	GR 0+	13	65.0	2.2	9.0	n/a												
								RB 0+	4	47.0	1.1														
								RB	2	166.0	33.5														
								BT 0+	16	66.0	3.1														
								BB	2	200.0	44.4														
								SU	1	97	9.2														
8	Mainstem (34.1 km)	3	Y	10 564001 6074007	56,566	95/09/26	750	RB	2	150		7.5	n/a												
								BB	4	192.5	42.7														
								CC	92+	200															
								MW	1	80.0	2.4														
9	Mainstem (35.8 km)	4	Y	10 565841 6073977	56,566	95/08/18	3,500	RB	3	130.0	27.6		95/09/19	5,789	9.4	18.1	0.0	225	2,027	3,537	8.4	20	40	40	
								BT	3	155.0	42.9														
								BB	2	209.0	50.3														
10	Mainstem (38.5 km)	4	Y	10 568081 6074087	56,566	95/09/27	287	BT 0+	3	78.0	4.6	7.5	95/09/27	5,854	13.2	21.3	0.2	342	1,657	3,855	13.0	10	40	50	1.17
								BT	2	134.0	22.4														
								CC	38																
11	Mainstem (50.8 km)	5	Y	10 577442 6075416	56,566	95/09/29	1,421	BT 0+	2	55.0	1.5	7.0	95/09/29	502	5.8	12.2	0.7	145	182	195	7.5	20	60	20	0.38
								BT	8	198.0	104.1														
12	Mainstem (54 km)	6	Y	10 580303 6076906	56,566	95/08/15	210	BT	1	198.0	106.0	6.0	95/08/15	150	5.0	8.3	3.5	7.6	0	143	60.0	15	15	70	0.45
13	Tributary 072	n/a	N	10 547891 6063520	4,378	95/08/23	625	none				9.5	95/07/18	800	2.0	4.0		800	0	0		90	10	0	0.28
14	Tributary 154	1	N	10 549901 6064740	3,763	95/08/30	495	RB	5				95/08/30	495	3.0	5.0	2.6	50	0	445	10.0	50	30	20	
15	Tributary 154	2	N	10 549941 6065060	3,763	95/08/30	380	RB 0+	16	40.0	0.7	9.0	95/08/30	810	3.0	6.0	1.9	25	0	564	15.0	10	50	40	
								RB	18	95.0	9.6														
								SU	1	120.0	0.7														
16	Tributary 154	3	N	10 550001 6065170	3,763	95/08/31	524	none				7.0	95/08/30	245	3.1	4.4	3.5	40	16	180	13.7	20	40	40	
17	Tributary 163	n/a	N	10 550991 6064460		95/08/29	100	none				8.0	95/08/29	100	1.0	1.5	6.8	10	0	90	9.0	10	80	10	0.04
18	Tributary 199	n/a	N	10 552051 6065110	5,720	95/08/29	240	none				7.0	95/08/29	758	4.7	5.9	1.2	79	16	663	8.7	10	80	10	0.40
19	Tributary 257	1	N	10 553501 6067060		95/08/30	400	SU	2	140.0		9.0	95/08/30	2,400	8.0		0.0	2,400	0	0	2.0	80	20	0	
20	Tributary 257	2	N	10 553651 6067780		95/08/30	165	none				8.0	95/08/30	165	1.0	1.0	5.5	16	0	149	10.0	10	60	30	
21	Tributary 295	1	N	10 554351 6068550	10,182	95/08/17	5,913	BT	1	153.0	32.8	8.0	95/08/25	1,802	11.3	14.2	0.8	150	180	1,472	24.8	10	20	70	
								RB	1	89.0	7.8														

ABBREVIATIONS:

GR = Arctic grayling
GR 0+ = young-of-the-year Arctic grayling
RB = rainbow trout
RB 0+ = young-of-the-year rainbow trout
BT = bull trout
BT 0+ = young-of-the-year bull trout
BT obs. = observed bull trout
MW = mountain whitefish
BB = burbot
SU = suckers (general)
CC = sculpins (general)
?? = unidentified species
p/a = presence/absence electrofishing (no stop nets used)
n/a = not applicable
dom = dominant

Table 3a (continued). Table River mainstem and tributary electrofishing sites combined with stream survey site data collected in 1995. Site locations are shown on Figure 8.

						ELECTROSHOCKING DATA							STREAM SURVEY DATA													
								Fish Captured									Area of			Mean	Substrate				
E.L. site # (on map)	Location	Reach #	Video	NAD 83 U.T.M. coordinate	Total stream length (m)	E.L. date (ym/d)	S.A. E.L. (m²)	species	# fish	mean F.L. (mm)	mean wt. (g)	Water temp (°C)	Date surveyed (ym/d)	S.A. surveyed (m²)	Avg. w.w. (m)	Avg. c.w. (m)	Stream gradient (%)	pool (m²)	glide (m²)	riffle (m²)	D-90 (cm)	fines (%)	gravels (%)	larges (%)	Stream discharge (m³/s)
22	Tributary 293	1	N	10.554581.6067669	10,192	95/07/10	600	RB 0+	22	38.0	0.6	9.0	95/07/10	4,523	7.7	14.8	0.6	365	1,294	2,118	24.3	10	30	60	2.10
								RB	14	129.0	31.0														
								BT	3	69.0	3.3														
								CC	76																
23	Tributary 293	2	N	10.554220.6068500	10,192	n/a	n/a	n/a					95/09/05	388	7.8	11.4	1.0	0	38	350	39.5	10	30	60	2.42
24	Tributary 353	1	Y	10.557061.6067369	10,192	95/09/21	483	RB 0+	6	39.0	0.9	10.0	95/09/13	1,762	7.0	12.1	0.6	202	724	836	14.9	30	40	30	
								CC	19																
25	Tributary 404	n/a	N	10.556851.6068039	4,455	95/08/23	990	RB 0+	4	28.0		7.5	95/07/12	693	4.4	10.2	5.2	0	58	675	37.0	10	10	80	0.32
								CC	1																
26	Tributary 427	n/a	N	10.559031.6069116	5,909	95/08/15	2,200	RB 0+	5			8.5	95/07/05	244	3.1	4.4	3.5	48	18	180	13.7	20	30	50	0.70
								BT	1	90.0															
								MW	5																
								CC	11																
27	Tributary 427	n/a	N	10.558721.6069508	5,909	95/08/16	720	CC	4				n/a												
28	Tributary 431	n/a	N	10.561441.6069828	6,733	95/08/23	624	none				8.0	95/08/24	630	3.3	4.7	0.9	110	107	413	8.8	50	40	10	0.17
29	Tributary 431	n/a	N	10.559591.6069058	6,733	95/09/08	300	SU	12	48.0		11.0	n/a												
30	Tributary 486	1	Y	10.562221.6069898	24,245	95/09/08	960	RB	2	174.0	57.9	11.5	95/07/06	9,231	12.9	18.8	0.7	985	1,018	7,248	51.9	10	20	70	3.80
								BB	6	165.0	37.9														
								MW	1	143.0	29.1														
								CC	52																
31	Tributary 496	3	Y	10.567091.6068068	24,245	95/09/29	330	BT (obs.)	2			7.0	95/09/25	705	5.5	18.6	0.2	0	442	263	20.2	20	50	30	
32	Tributary 527	1	Y	10.562321.6071708	10,074	95/09/29	520	RB 0+	1	64.0	4.5	7.5	95/09/20	897	5.3	14.5	0.8	161	215	521	15.1	10	30	60	0.13
								RB	1	95.0	6.5														
								BT	1	63.0	3.0														
								BB	1	210.0	50.0														
								MW	2	73.0	2.6														
								CC	74																
33	Tributary 605	1	Y	10.564851.6074367	11,400	95/08/24	2,750	RB 0+	2	48.0	1.4	7.5	95/08/23	4,063	10.8	10.9	0.5	841	1,119	2,103	34.1	10	20	70	
								BT 0+	9	44.0	0.9														
								BT	3	126.0	27.7														
								TR	1	20.0															
34	Tributary 610	1	Y	10.565451.6075017	19,048	95/09/01	5,050	RB	3	209.0	109.6		95/07/20	6,543	12.1	17.5	0.2	656	2,587	3,290	28.1	20	30	50	1.93
								BT	2	185.0	65.1														
								BB	11	215.0	57.9														
								MW	2	64.0	2.1														
								CC	203																
35	Tributary 626	1	Y	10.565541.6074007	5,655	95/08/22	1,068	RB 0+	6	41.0	2.0		95/07/11	1,552	6.6	8.6	1.2	192	168	1,192	10.8	10	60	30	
								RB	22	92.0	10.8														
								BT 0+	10	48.0	1.5														
								BT	15	98.0	18.2														
								CC	8	49.0	2.3														
36	Tributary 626	2	Y	10.566611.6072817	5,655	95/08/22	835	BT	2	125.0			95/07/12	887	5.2	9.2	6.1	36	0	709	80.0	10	10	80	

Table 3b. Table River mainstem and tributary electrofishing sites combined with stream survey site data collected in 1996. Site locations are shown on Figure 8.

						ELECTROSHOCKING DATA							STREAM SURVEY DATA													
E.L. site # (on map)	Location	Reach #	Video	NAD 83 U.T.M. coordinate	Total stream length (m)	E.L. date (y/m/d)	S.A. E.L. (m²)	Fish Captured: species	# fish	mean F.L. (mm)	mean wt. (g)	Water temp. (°C)	Date surveyed (y/m/d)	S.A. surveyed (m²)	Avg w.w. (m)	Avg c.w. (m)	Stream gradient (%)	Area of: pool (m²)	glide (m²)	riffle (m²)	Mean D-90 (cm)	Substrate: fines (%)	gravels (%)	larges (%)	Stream discharge (m³/s)
37	Mainstem (6 km)	1	Y	10 548321 6063457	56,566	96/08/11	p/e	BT	1	50.0			n/a												
								GR	1	55.0															
								MW	3																
38	Mainstem (8 km)	1	Y	10 549428 6064418	56,566	96/08/11	p/e	BB	1	125.0			n/a												
39	Mainstem (10.3 km)	2	Y	10 550501 6065649	56,566	96/08/12	p/e	GR	3	50.0			n/a							dom					
								MW	5	83.0															
40	Mainstem (12.2 km)	2	Y	10 551828 6066195	56,566	96/08/13	p/e	GR	1	51.0			n/a										dom		
41	Mainstem (14.0 km)	2	Y	10 552955 6066436	56,566	96/08/12	p/e	GR	17	50.1			n/a											dom	
								BB	1	160.0															
								BT	1	84.0															
								MW	4	82.5															
								RB	2	86.0															
								SU	2																
42	Mainstem (14.8 km)	2	Y	10 553411 6066885	56,566	96/08/12	p/e	GR	7	46.1			n/a											dom	
43	Mainstem (16.2 km)	2	Y	10 554326 6067350	56,566	96/08/12	p/e	GR	1	44.0			n/a											dom	
								BT	1	83.0															
44	Mainstem (16.4 km)	2	Y	10 557101 6066392	56,566	96/08/12	p/e	none					n/a												
45	Mainstem (16.5 km)	2	Y	10 554603 6067160	56,566	96/08/13	p/e	GR	5	46.8			n/a										dom		
								RB	1	31.0															
46	Mainstem (18.5 km)	2	Y	10 556091 6066309	56,566	96/08/12	p/e	GR	2	46.5			n/a											dom	
								BT	2	83.0															
								MW	1																
47	Mainstem (22.2 km)	2	Y	10 558441 6067834	56,566	96/08/12	p/e	GR	9	57.3		9.0	n/a											dom	
								BT	3	49.7															
48	Mainstem (22.7 km)	2	Y	10 558841 6068200	56,566	96/08/12	p/e	GR	12	47.1		9.0	n/a											dom	
								BT	1	66.0															
49	Mainstem (24 km)	2	Y	10 559048 6068169	56,566	96/08/10	p/e	BT	2	60.0			n/a												
								RB	5	78.8															
								MW	10																
50	Mainstem (25.8 km)	2	Y	10 559518 6070568	56,566	96/08/11	p/e	GR	6	46.8		9.0	n/a							dom					
								BT	3	62.7															
51	Mainstem (26.8 km)	3	Y	10 560694 6070374	56,566	96/08/11	p/e	BT	1	62.0		8.0	n/a												
								MW	1																
52	Mainstem (28 km)	3	Y	10 561326 6070808	56,566	96/08/11	p/e	BT	6	58.0		9.0	n/a							dom					
								RB	1	58.0															
								MW	4	52.3															
53	Mainstem (29.4 km)	3	Y	10 562202 6071472	56,566	96/08/11	p/e	GR	1	38.0		8.0	n/a												
								BT	8	55.2															
								RB	4	31.0															
								MW	3																
54	Mainstem (29.8 km)	3	Y	10 562301 6071966	56,566	96/08/11	p/e	BT	11	58.4		10.0	n/a												
								RB	1	34.0															
								MW	3	45.7															
55	Mainstem (31.4 km)	3	Y	10 563431 6072518	56,566	96/08/11	p/e	BT	10	57.0		10.0	n/a												
								MW	2	50.0															

Table 3b (continued). Table River mainstem and tributary electrofishing sites combined with stream survey site data collected in 1996. Site locations are shown on Figure 8.

						ELECTROSHOCKING DATA							STREAM SURVEY DATA												
E.L. site # (on map)	Location	Reach #	Video	NAD 83 U.T.M. coordinate	Total stream length (m)	E.L. date (y/m/d)	S.A. E.L. (m²)	Fish Captured: species	# fish	mean F.L. (mm)	mean wt. (g)	Water temp (°C)	Date surveyed (y/m/d)	S.A. surveyed (m²)	Avg w.w (m)	Avg c.w (m)	Stream gradient (%)	Area of: pool (m²)	glide (m²)	riffle (m²)	Mean D-90 (cm)	Substrate: fines (%)	gravels (%)	larges (%)	Stream discharge (m³/s)
56	Mainstem (31.5 km)	3	Y	10 563538 6072406	56,566	96/09/11	p/e	BT	5	53.2		8.0	n/a												
								MW	1																
57	Mainstem (34.2 km)	3	Y	10 564561 6074352	56,566	96/09/13	p/e	BT	8	57.9		9.0	n/a												
58	Mainstem (37 km)	4	Y	10 567021 6074087	56,566	96/09/13	p/e	BT	8	55.8		7.0	n/a											dom	
59	Tributary 353	1	Y	10 557101 6066392	10,182	96/09/12	600	CC	10	85.0		8.0	96/09/12	600	8.0	11.0	2.5	30	30	540	50.0	10	10	80	2.53
60	Tributary 427	n/a	N	10 559041 6069308	5,600	96/07/24	375	RB	7	96.9	18.7	9.0	n/a		2.5										
								BT	2	79.0	8.2														
								CC	24																
61	Tributary 431	n/a	N	10 561475 6069606	8,733	96/07/24	300	none				12.0	n/a		1.5										
62	Tributary 431	n/a	N	10 559401 6068869	8,733	96/08/02	300	MW	3			10.0	96/08/02	300	5.0	7.0	0.6	270	0	30	12.0	40	20	40	
								SU	7	80.0															
								CC	10	35.0															
								??	8	20.0															
83	Tributary 498	3	Y	10 566018 6068832	24,245	96/08/07	180	BT	1	70.0		12.0	96/08/07	600	10.0	12.0	2.1	0	0	600	50.0	10	10	80	
84	Tributary 498	3	Y	10 565911 6067113	24,245	96/08/22	600	none				9.0	96/08/22	600	8.0	10.0	2.7	0	720	0	70.0	10	5	85	
85	Tributary 498	4	Y	10 570051 6069988	24,245	96/08/08	330	BT	1	82.0		9.0	96/08/08	330	8.8	10.0	1.2	66	0	264	40.0	5	20	75	
86	Tributary 498	5	Y	10 574029 6070583	24,245	96/08/08	207	BT	3	185.3	78.7	11.0	96/08/08	207	5.3	8.8	0.9	41	0	165	70.0	10	15	75	
87	Tributary 527	1	Y	10 581781 6072098	10,074	96/08/22	280	none				8.0	96/08/22	2,450	7.0	8.0	1.40	0	245	2,205	35.0	10	30	60	
88	Tributary 805	1	Y	10 581515 6076519	11,400	96/08/07	600	none				9.0	96/08/07	600	8.0	7.0	3.4	30	0	570	80.0	10	20	70	
89	Tributary 810	2	Y	10 580366 6078984	19,048	96/08/07	800	none				8.0	96/08/07	2,100	14.0	15.0	0.8	210	210	1,680	80.0	10	30	50	
70	Tributary 810	3	Y	10 584490 6079480	19,048	96/08/22	1,400	none				8.0	96/08/22	1,400	7.0	8.0	0.7	280	560	560	13.0	5	25	70	
71	Tributary 810	5	Y	10 570040 6083735	19,048	96/08/22	600	none				7.0	96/08/22	800	8.0	10.0	2.20	80	640	80	80.0	5	10	85	

Heading Key for Tables 3a and 3b.

						ELECTROSHOCKING DATA							STREAM SURVEY DATA												
E.L. site # (on map)	Location	Reach #	Video	NAD 83 U.T.M. coordinate	Total stream length (m)	E.L. date (y/m/d)	S.A. E.L. (m²)	Fish Captured: species	# fish	mean F.L. (mm)	mean wt. (g)	Water temp. (°C)	Date surveyed (y/m/d)	S.A. surveyed (m²)	Avg w.w (m)	Avg c.w (m)	Stream gradient (%)	Area of: pool (m²)	glide (m²)	riffle (m²)	Mean D-90 (cm)	Substrate: fines (%)	gravels (%)	larges (%)	Stream discharge (m³/s)
1	2	3	4	5	6	7	8	9				10	11	12	13	14	15	16			17	18			19

1) Electrofishing site number located on Figure 8.
2) Electrofishing site location within the Table River watershed.
3) Stream reach within which electrofishing occurred (as shown in Figure 8).
4) Video surveyed (Y=yes; N=no)
5) NAD 83 UTM coordinate of electrofishing site.
6) Total length of electrofished stream.
7) Date electrofishing occurred.
8) Surface area of stream electrofished.
9) Information on fish captured by electrofishing (species, fish numbers, mean fork length, and mean weight)
10) Water temperature while electrofishing.
11) Date of stream survey.
12) Surface area of stream surveyed.
13) Average wetted width of stream in surveyed area.
14) Average channel width of stream in surveyed area.
15) Stream gradient within surveyed area.
16) Area of pools, glides, and riffles within the surveyed area.
17) Mean D-90 of substrate (see Appendix D).
18) Percent fines, gravels, and larges of substrate in the surveyed area.
19) Stream discharge within the surveyed area.

In 1996, 22 mainstem sites were electrofished, as well as 13 sites on 7 different tributaries from July 24 to September 13. The mainstem surface area electrofished in 1996 was not recorded; the surface area of the electrofished tributaries was 6,752 m^2. Table 3b summarizes the fish catch data for each site electrofished in 1996 as well as related stream survey data for 11 tributary sites. The location of each site within the watershed is shown in Figure 8.

All fish captured during electrofishing were juveniles except for sculpins, which will be covered here for ease of reporting. In open electrofishing sites, sculpins were occasionally not enumerated because of the high numbers caught and because an emphasis was placed on capturing sport fish.

Table 4 summarizes the numbers of all fish species/genera caught in the mainstem and tributaries of the Table River. The surface area electrofished in each area is given below column headings with the exception of the 1996 mainstem where surface areas were not measured by the field crew. Sculpin numbers are lower than actual since sculpins were often too numerous to enumerate (thus the value of 185+ fish captured in the mainstem in 1995, Table 4). It must be noted that electrofishing site selection may have been biased towards the recovery of sport fish since locating juvenile Arctic grayling was a priority.

Table 4. Summary of juvenile fish numbers captured by electrofishing in 1995 and 1996 in the Table River watershed. The number of sites within which the species/genera were caught is shown in brackets.

	1995			1996		
Fish group	Captured in Mainstem (15,518m^2)	Captured in Tributaries (25,610m^2)	Total Fish Captured (41,128m^2)	Captured in Mainstem (unknown)	Captured in Tributaries (6,752 m^2)	Total Fish Captured (unknown)
Arctic grayling	13 (1)	0 (0)	13 (1)	65 (12)	0 (0)	65 (12)
bull trout	35 (5)	49 (9)	84 (14)	69 (16)	7 (4)	76 (20)
burbot	11 (5)	17 (3)	27 (8)	2 (2)	0 (0)	2 (2)
mountain whitefish	8 (4)	10 (4)	18 (8)	37 (11)	3 (1)	40 (12)
rainbow trout	16 (5)	126 (12)	140 (17)	14 (5)	7 (1)	21 (6)
sculpins (general)	185+ (6)	447 (9)	632 (15)	0 (0)	44 (3)	44 (3)
suckers (general)	2 (2)	15 (3)	17 (5)	2 (1)	7 (1)	9 (2)
Total	270	662	931	189	68	257

In 1995, sculpins were the most numerous species/genus caught in both the mainstem and in the tributaries surveyed. Sculpins were caught in 50% of surveyed mainstem sites, and in 38% of tributary sites. Bull trout were the most abundant sport fish species caught in the mainstem (35), found in 42% of surveyed sites. Rainbow trout

were the most abundant sport fish caught in the tributaries (126), found in 50% of surveyed sites.

In 1996, bull trout were the most abundant species caught both overall (76) and in the Table River mainstem (69). Bull trout were found in 73% of surveyed mainstem sites, and in 31% of tributary sites. Although no sculpins were recorded in the mainstem in 1996, they were again the most abundant genera caught in the surveyed tributaries (44), and were found in 23% of surveyed sites. Rainbow trout were again the most frequently caught sport species in tributaries in 1996, along with bull trout (7 each). However, rainbow trout were only found in 8% of surveyed tributary sites, whereas bull trout were found in 31% of sites.

In 1995, Arctic grayling was the least abundant species caught overall (1%), and was the least abundant sport species caught in the mainstem (5%). In 1996, the least abundant species caught overall was burbot (2), although rainbow trout was the least abundant sport species caught both overall (21) and in the mainstem (14). No Arctic grayling were caught in any tributaries in 1995 and 1996. Although Arctic grayling were found in only 8% of surveyed mainstem sites in 1995, they were found in 92% of mainstem sites in 1996. This is mainly due to the fact that the electrofishing effort in tributaries in 1996 was greatly reduced from that in 1995 and the electrofishing effort in the mainstem in 1996 was much more intensive than that in 1995. This change in electrofishing effort from 1995 to 1996 was done exclusively in order to target sites where Arctic grayling young-of-the-year were found in 1995. In addition there was also a targetting of potential bull trout young-of-the-year habitat during electrofishing surveys.

The 1995 and 1996 electrofishing results suggest that the tributaries of the Table River are important for juvenile rainbow trout. Although Arctic grayling were not captured nor observed in the Table River tributaries, there is no evidence that these tributaries are not important to Arctic grayling spawning and early rearing. Stuart and Chislet (1979) reported that grayling in the Sukunka drainage may use mainstem river tributaries and side-channels for spawning. Stewart et al. (1982) found in a tributary to the Prophet River, that newly emerged fry in late June remained along stream margins close to the spawning areas, gradually moving out into deeper and faster water. After late June, these grayling fry were no longer found in spawning and early rearing tributaries, but were instead found in the mainstem reaches of the Liard River system, indicating downstream transport. Newly emerged grayling fry are small, weak swimmers that are vulnerable to high stream discharge, thus fry are carried downstream to the mainstem during high spring flows (Stuart and Chislett 1979). As a result, the mainstem shore margin areas may be the most important rearing location for Arctic grayling young-of-the-year juveniles in the Table River. In both 1995 and 1996 there were no stream surveys conducted at sites in the Table River mainstem where Arctic grayling young-of-the-year were caught by electrofishing. Thus the habitat requirements/preferences of Arctic grayling young-of-the-year cannot yet be described in the Table River. In addition, Butcher et al. (1981) who did limited tagging of adult grayling in two tributaries of the Liard River, concluded that most post-spawning adults had left their spawning

areas by early summer to return to the mainstem river. If this is the case, spawning adults and emerging fry would have been missed during the electrofishing surveys which did not commence until July 10 and July 24 in 1995 and 1996, respectively. Providing additional support for the potential downstream transport of grayling fry in Table River tributaries are the high flows observed during early 1995 and 1996 in the Table River watershed. Water Survey Canada flow data recorded at a site on the Parsnip River approximately 60 km downstream from the mouth of the Table River from April through October 1995, indicate that the flows of the Parsnip River were similar to the 23 year mean from 1968 to 1990 (Anonymous 1991). Thus, the periods of high flows observed in the Table River in 1995 and 1996, which extended into mid-July, could be the norm for this system.

To assess the relative abundances of fish species/genera in the reaches of the mainstem and tributaries of the Table River, the percent electrofishing catch was determined using data from both 1995 and 1996 (Table 3a,b). All fish species/genera except dace and northern squawfish were found by electrofishing within the Table River mainstem. Table 5a,b shows the total numbers of fish caught within each reach surveyed in the Table River watershed in 1995 and 1996, and the percentages of each fish species/genera caught within each reach. Note that sculpin numbers represent numbers enumerated which are lower than the numbers actually caught.

Table 5a. Total numbers of juvenile fish caught by electrofishing in each Table River mainstem reach surveyed in 1995 and 1996, and the percent of each species/genera caught in each reach.

Location	Reach No.	% Caught							Total No. of fish
		BT	GR	MW	RB	BB	SU	CC	
Mainstem	1	5.3	5.3	21.0	5.3	10.5	5.3	47.4	19
Mainstem	2	16.2	13.1	9.1	10.1	4.0	1.0	46.5	99
Mainstem	3	29.0	0.6	8.9	4.7	2.4	0	54.4	169
Mainstem	4	24.6	0	0	5.3	3.5	0	66.7	57
Mainstem	5	100	0	0	0	0	0	0	10
Mainstem	6	100	0	0	0	0	0	0	1

The surface areas electrofished in each mainstem and tributary reach in Table 5a,b varies significantly (see Table 3a,b). Recall that electrofishing site selection was biased towards capturing young-of-the-year Arctic grayling and bull trout.

Table 5b. Total numbers ofjuvenile fish caught by electrofishing in each Table River tributary reach surveyed in 1995 and 1996, and the percent of each species/genera caught in each reach.

Location	Reach No.	% Caught							Total No. of fish
		BT	GR	MW	RB	BB	SU	CC	
Trib 072	n/a	0	0	0	0	0	0	0	0
Trib 154	1	0	0	0	100	0	0	0	5
	2	0	0	0	96.7	0	3.2	0	31
	3	0	0	0	0	0	0	0	0
Trib 163	n/a	0	0	0	0	0	0	0	0
Trib 199	n/a	0	0	0	0	0	0	0	0
Trib 257	1	0	0	0	0	0	100	0	2
	2	0	0	0	0	0	0	0	0
Trib 293	1	3.4	0	0	31.1	0	0	65.5	119
Trib 353	1	0	0	0	18.8	0	0	81.2	32
Trib 404	n/a	0	0	0	80.0	0	0	20.0	5
Trib 427	n/a	5.4	0	9.1	21.8	0	0	63.6	55
Trib 431	n/a	0	0	9.4	0	0	59.4	31.2	32
Trib 496	1	0	0	1.7	3.3	8.3	0	86.7	60
	3	100	0	0	0	0	0	0	3
	4	100	0	0	0	0	0	0	1
	5	100	0	0	0	0	0	0	3
Trib 527	1	1.2	0	2.5	2.5	1.2	0	92.5	80
Trib 605	1	85.7	0	0	16.7	0	0	0	14
Trib 610	1	0.9	0	0.9	1.4	5.0	0	91.8	221
	2	0	0	0	0	0	0	0	0
Trib 626	1	29.4	0	0	54.9	0	0	15.7	51
	2	100	0	0	0	0	0	0	2

BT = bull trout MW = mountain whitefish BB = burbot CC = sculpins
GR = Arctic grayling RB = rainbow trout SU = suckers

Electrofishing Results - Population Estimates

Population estimates were determined for juvenile rainbow trout and bull trout in 14 sites on the Table River mainstem and tributaries from August 22 to September 29, 1995. The estimated population densities are presented and discussed in Zemlak and Langston in prep. Closed site electrofishing to obtain juvenile fish population estimates was not conducted in 1996.

Adults

Single Pass Underwater Fish Counts

The observed and expanded fish numbers for each kilometre section of the Table River surveyed in 1995 and 1996 are shown in Tables A1 (taken from Zemlak and Langston in prep.) and A2, respectively (Appendix A). Each kilometre location listed in both tables indicates the start of the section surveyed. For example, kilometre 36 in Table A1 indicates the number of fish observed from swimming from km 36 to km 35. In Table A1, km 36 values have been doubled as only 500 m of this section was underwater surveyed. In 1995 (Table A1) km 29-25 was not surveyed due to difficult access. In Table A2, note that the fish counts for km 37.6 are representative of only 600 m of this section since a waterfall occurs at km 37.6. In addition, only 800 m of km 25-24 section was surveyed, thus total and expanded counts have been corrected to represent the entire 1 km section.

In the 1995 underwater survey (Table A1), Zemlak and Langston (in prep.) found mountain whitefish to be the most numerous fish species observed (2,627 individuals) over the entire survey length. The next highest counts were for suckers at 693 individuals, Arctic grayling at 165, rainbow trout at 66, northern squawfish at 51, and finally bull trout, at 22 individuals. The highest number of fish were observed between km 24 and 23 (491 fish).

In the 1996 underwater survey (Table A2), the most frequently observed species over the total surveyed length was again mountain whitefish (3,636 individuals). The next most commonly observed species/genera were Arctic grayling at 191 individuals, suckers at 34, bull trout at 28, and finally rainbow trout at 3 individuals. Northern squawfish were not observed in the 1996 survey. The highest number of fish were observed from km 29 to km 28 (525 fish).

The expanded single pass snorkel survey results shown in Appendix A are presented graphically in Figure 9 (1995 results) and Figure 10 (1996 results). The location of the highest numbers of all fish enumerated was km 24-23 in the 1995 survey (701.4 fish) and km 26-25 in 1996 (1246.9 fish).

During the 1995 underwater survey, the Arctic grayling expanded counts were noticeably higher in the upper river kilometre sections, peaking at km 36 (45 inividuals). In 1996, the highest expanded grayling count occurred at km 29 (54.1 fish) a section that was not surveyed in 1995.

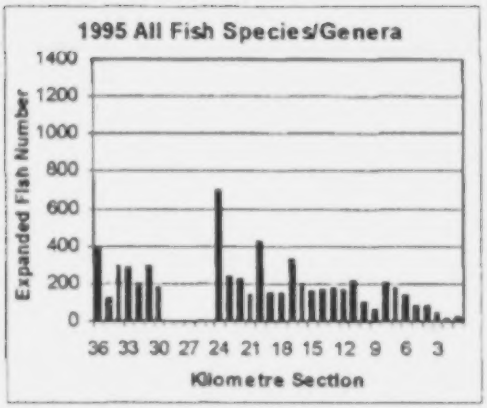
Bull trout distribution was relatively uniform in low concentrations along the entire length of the survey area in the 1995 survey, peaking at km 34 (6.3 fish). The numbers of bull trout throughout the 1996 survey area was similar to those found in equivalent sections in 1995. In 1996, the highest number of bull trout were found at km 37.6-37 (18.1 fish), just below the first set of falls.

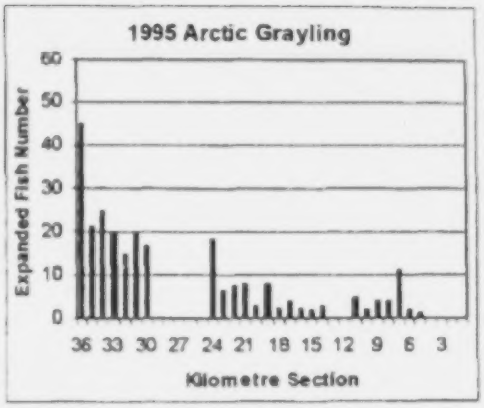
The highest count for mountain whitefish was found at km 24 (640 fish) during the 1995 survey. In the 1996 survey, expanded whitefish counts were considerably higher for each equivalent kilometre section, compared to 1995 results. The average number of whitefish/km in the 1996 survey was 521.2, compared to 139.5/km in 1995.

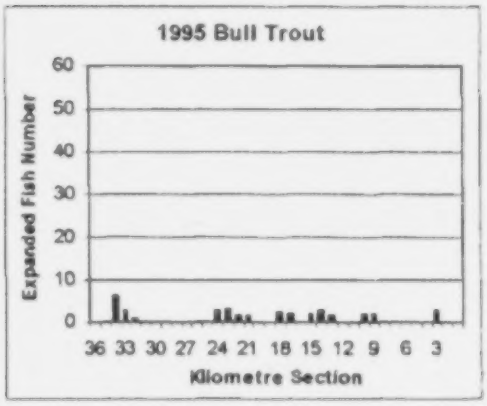
Rainbow trout numbers in 1995 were fairly uniform throughout the survey area, but increased slightly in the lower sections, and peaked at 8 km (19 individuals). The 1996 survey revealed a similar distribution of rainbow trout for the same section of river surveyed. The highest expanded count of rainbow trout in 1996 was only 3.6 individuals from km 25 to 24.

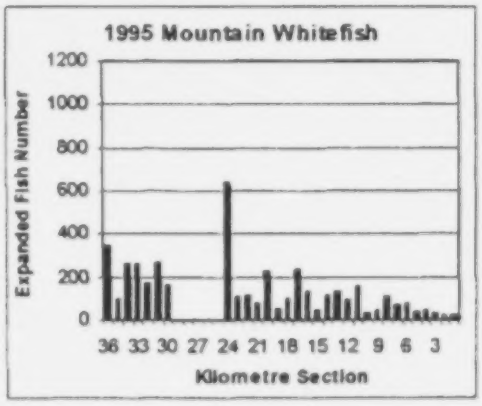
Although km 29 to km 25 was not snorkel surveyed, in both the 1995 and 1996 surveys, expanded sucker numbers were higher in the lower surveyed sections of the river. They were found only from km 25 to km 3 in the 1995 survey, and from km 30 to km 25 in the 1996 survey. In the 1995 survey, the highest density of suckers was found from km 20 to km 19 (198 per km). Very large schools were observed in this one kilometre section which is almost entirely a low gradient glide with very little/no cover (Langston in prep.). The highest density of suckers found in the 1996 survey was in the km 26-25 section of the river (77.4 per km).

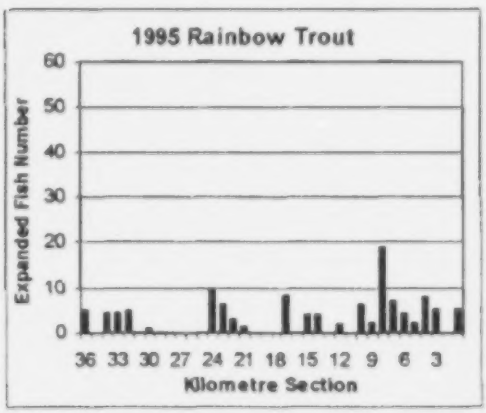
In the 1995 snorkel survey, high numbers of fish were observed at the km 24, km 17, and km 7 sections. These sites are similar in that they contain deep pools or deep pools associated with a large debris jam. It has not yet been determined if ideal adult summer rearing/feeding habitat such as these pools is a limiting factor to the overall size of the fish populations in the Table River. These pools do have the capacity, due to their large size and depth, to provide suitable overwintering habitat (Langston in prep.). If further investigations identify that this type of habitat is limiting population size, the opportunity to enhance the fish populations through debris catchers and pool creation could be examined.

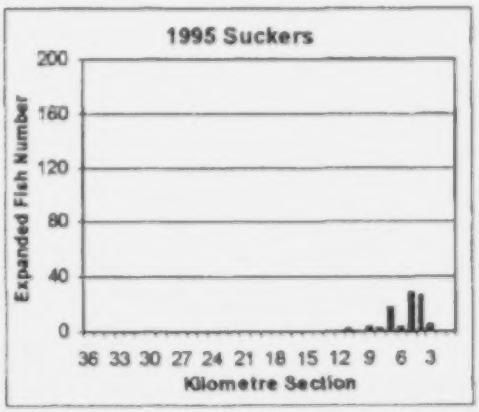

1995 All Fish Species/Genera
Expanded Fish Number
1400
1200
1000
800
600
400
200
0
36 33 30 27 24 21 18 15 12 9 6 3
Kilometre Section

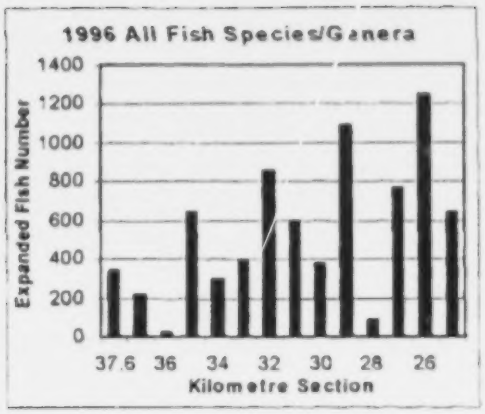

1995 Arctic Grayling
Expanded Fish Number
60
50
40
30
20
10
0
36 33 30 27 24 21 18 15 12 9 6 3
Kilometre Section

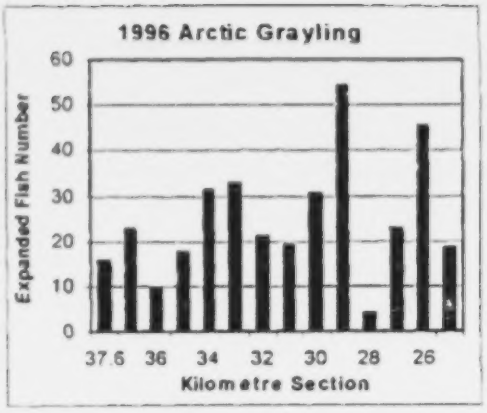

1995 Bull Trout
Expanded Fish Number
60
50
40
30
20
10
0
36 33 30 27 24 21 18 15 12 9 6 3
Kilometre Section

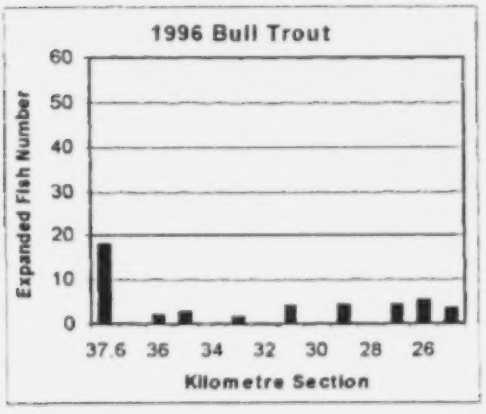

1995 Mountain Whitefish
Expanded Fish Number
1200
1000
800
600
400
200
0
36 33 30 27 24 21 18 15 12 9 6 3
Kilometre Section

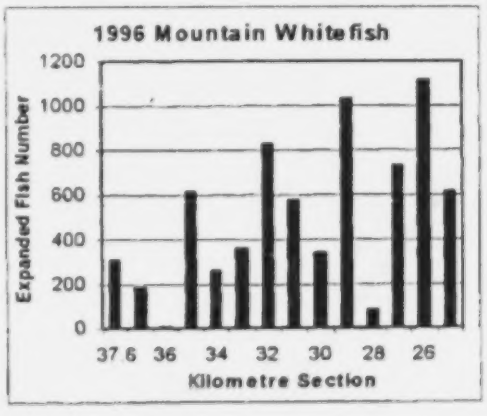

1995 Rainbow Trout
Expanded Fish Number
60
50
40
30
20
10
0
36 33 30 27 24 21 18 15 12 9 6 3
Kilometre Section

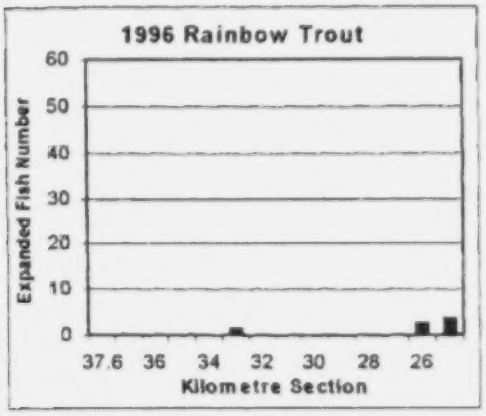

1995 Suckers
Expanded Fish Number
200
160
120
80
40
0
36 33 30 27 24 21 18 15 12 9 6 3
Kilometre Section

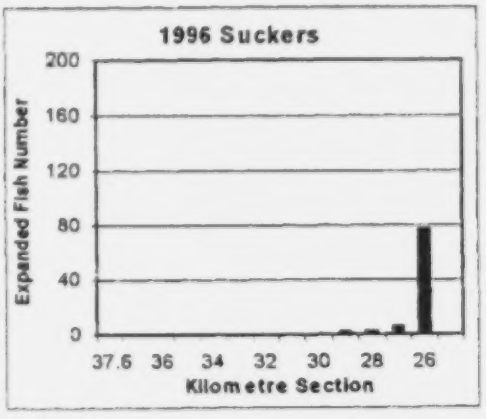

1996 All Fish Species/Genera
Expanded Fish Number
1400
1200
1000
800
600
400
200
0
37.6 36 34 32 30 28 26
Kilometre Section


1996 Arctic Grayling
Expanded Fish Number
60
50
40
30
20
10
0
37.6 36 34 32 30 28 26
Kilometre Section


1996 Bull Trout
Expanded Fish Number
60
50
40
30
20
10
0
37.6 36 34 32 30 28 26
Kilometre Section


1996 Mountain Whitefish
Expanded Fish Number
1200
1000
800
600
400
200
0
37.6 36 34 32 30 28 26
Kilometre Section


1996 Rainbow Trout
Expanded Fish Number
60
50
40
30
20
10
0
37.6 36 34 32 30 28 26
Kilometre Section


1996 Suckers
Expanded Fish Number
200
160
120
80
40
0
37.6 36 34 32 30 28 26
Kilometre Section

The expanded fish counts obtained from the 1995 and 1996 single pass surveys (Tables A1 and A2) were used to estimate fish numbers per reach surveyed. In 1995, reaches #1-3 were covered in the single pass survey. Fish counts were not done in a 3 kilometre section in reach #2 (km 27-24), and in a 2 kilometre section in reach #3 (km 29-27), due to difficult access. In 1996, only reach #3 was covered in entirety. Table 6 presents the fish numbers estimated for reaches #1-3 for 1995, and for reach #3 for 1996. Fish counts for reaches #2 and #3 (1995 data) have been corrected for the missing kilometre sections and thus are rough estimates of fish numbers.

Table 6. Expanded fish number estimates per reach obtained from single pass snorkel surveys on the Table River mainstem in 1995 and 1996.

	1995 Fish Numbers			1996 Fish Numbers
Fish species/genera	Reach #1 (km 0-9.1)	Reach #2 (km 26.7-9.1)	Reach #3 (km 34.9-26.7)	Reach #3 (km 34.9-26.7)
bull trout	5	27	14	12
Arctic grayling	23	87	157	211
mountain whitefish	465	2740	1643	4114
rainbow trout	54	55	20	2
suckers	218	1392	2	4
northern squawfish	89	3	0	0
Total	853	3585	1376	4339

Numbers of Arctic grayling and mountain whitefish observed in reach #3 during the 1996 survey appear to be higher than those observed in 1995. Table A2 shows that the highest numbers of Arctic grayling and whitefish were counted in the location of the debris jam (km 28-29), which was not surveyed in 1995, thus it is likely that the number estimates of grayling and whitefish in reach #3 (1995) are underestimated (Table 6).

Two Pass Underwater Fish Counts (Mark-recapture study)

A two pass underwater survey was conducted in conjunction with a Petersen mark-and-recapture survey to determine fish population estimates in a lower (km 9.8 to 5) and an upper (km 35.5 to 32) Table River subsection in August 1995. Results and discussion of these surveys can be found in Zemlak and Langston in prep. The two pass underwater and mark-and-recapture surveys were not replicated in the 1996 field season.

Length-at-age Results

Length-at-age data taken from Arctic grayling in the Table River in early August 1995 while Floy tagging, and from August to early September 1996 while radio-tagging, was compared to the length-at-age data collected from Arctic grayling in the nearby Anzac River while radio-tagging in fall 1996 (Table 7a), as well as other systems in the Williston Reservoir watershed (Table 7b). Comparisons made between the mean lengths of grayling in different systems may not be entirely accurate due to the variability among sample sizes, time and methods of collection, methods of analysis, and in age interpretation. However, general inferences can be drawn about relative growth rates.

Table 7a. Comparison of mean fork length and standard deviation for Arctic grayling sampled from the Table River in 1995 (taken from Zemlak and Langston in prep.) and 1996, as well as from the Anzac River in 1996.

Age	1995 Table River			1996 Table River			1996 Anzac River		
	Mean fork length (mm)	Std. Dev.	No. of fish	Mean fork length (mm)	Std. Dev.	No. of fish	Mean fork length (mm)	Std. Dev.	No. of fish
0	65	3.56	13	-	-	0	-	-	0
1	-	-	0	120	0.00	1	-	-	0
2	178	14.96	9	-	-	0	-	-	0
3	246	13.99	25	254	15.67	11	281	7.77	3
4	289	17.92	30	299	26.67	14	312	19.15	17
5	327	18.63	35	330	15.52	25	343	15.83	29
6	344	21.86	22	354	20.82	6	349	19.46	17
7	350	0	1	350	0.00	1	372	14.37	5
8	-	-	-	-	-	-	375	18.89	4

Table 7b. Comparison of mean fork length and standard deviation for Arctic grayling sampled from the Mesilinka, Nation and Parsnip rivers. Taken from Zemlak and Langston (in prep.).

Age	1990-92 Mesilinka River			1992 Nation River			1974 Parsnip River		
	Mean fork length (mm)	Std. Dev.	No. of fish	Mean fork length (mm)	Std. Dev.	No. of fish	Mean fork length (mm)	Std. Dev.	No. of fish
0	-	-	-	-	-	-	-	-	-
1	-	-	-	-	-	-	140	24.2	5
2	198	11.08	8	236	7.55	6	190	13.1	8
3	261	25.65	42	280	10.20	28	242	37.1	11
4	305	20.32	40	317	13.75	32	275	31.7	17
5	338	20.54	23	331	7.67	10	307	22.1	15
6	361	19.05	12	-	-	-	333	21.2	14
7	369	19.85	9	-	-	-	351	18.3	10
8	-	-	-	-	-	-	386	-	2

No significant difference in length was found when 1995 Table River grayling were compared to 1996 Table River grayling, for ages 3-6 ($\alpha \leq 0.05$). When 1996 Table River grayling were compared to 1996 Anzac River grayling, no significant difference in length was found for ages 3-4, and age 6. Age 5 Anzac River fish were found to be significantly larger than 1996 Table River fish. Age 7 fish were not statistically compared due to the small sample size of Table River Arctic grayling.

Mesilinka River grayling (data from Koning et al. 1995) captured from 1990-1992 were found to be significantly larger than 1995 Table River grayling for ages 2-6. Age 7 fish were not statistically compared due to the small sample size of Table River Arctic grayling. Nation River grayling (unpublished data, data on file, MELP, Prince George, BC.) were also significantly larger than 1995 Table River grayling for ages 2-4, although no difference was found between age 5 grayling. No significant difference in length was found between age 2 and 3 Parsnip River grayling (Bruce and Starr 1985) and 1995 Table River grayling, although the Table River grayling were found to be significantly longer than the Parsnip River fish for ages 4 and 5.

Beach Seine Results

The average surface area of the Table River mainstem beach seine sites was 665 m^2, ranging from 180 m^2 to 3510 m^2. Table 8 summarizes the percent catch of fish species/genera caught by beach seining the mainstem from July to September 1996. The total surface area seined in each reach, as well as the number of sites seined in each reach, is shown beneath column headings.

Table 8. Percent catch by beach seining on the Table River mainstem in 1996. Actual numbers of fish caught are shown in brackets.

Fish species/genera	Percent Catch		
	Reach #1 (19,850 m^2 - 20 sites)	Reach #2 (2,160m^2 -6 sites)	Reach #3 (9,473 m^2 - 20 sites)
Arctic grayling	7.4 (13)	0 (0)	7.4 (4)
mountain whitefish	51 (89)	54 (28)	72 (39)
rainbow trout	1.1 (2)	2 (1)	0 (0)
sculpins	41 (72)	44 (23)	20 (11)

Mountain whitefish were the most abundantly seined fish species in all three reaches. This trend is consistent with 1995 single pass snorkel survey results. Sculpins were the second most abundant fish type seined in all three reaches. Percent catches of rainbow trout and Arctic grayling were relatively low in comparison to mountain whitefish and sculpins, over the three reaches. Table A3 (Appendix A) contains beach seine data including site locations and descriptions as well as lengths/weights of the fish caught.

Activity Related Fish Habitat Impacts

During railroad and tunnel construction (1981-1983), sediment levels and water turbidity in the Table River became extremely high. A 1980 Sigma Resource Consultants Ltd. report, prepared for the B.C. Ministry of Industry and Small Business Development (Anonymous 1980), indicated that it was highly probable that the erosion of readily erodable silts in the Table River valley during construction, would create adverse impacts on the productive aquatic environment. Siltation and turbidity levels during construction were elevated to a point where the aquatic production (fish, insects, algae) in the Table River mainstem was severely impacted for three to four years (Dave King, Habitat Biologist, Ministry of Environment, Lands and Parks, Prince George, B.C., pers, comm., from Langston in prep.). However, an Acres Consulting report (Anonymous 1984) for BCR claimed that the total sediment load produced from tunnel construction was approximately one order of magnitude less than natural sediment erosion at the tunnels over the same time period. The report also indicated that railroad construction-related sediments generated from 1981-1983 in the Table River were of the same order of magnitude as those sediments produced from natural bank erosion and timber harvest in the catchment basin. The Table River system was believed to be capable of flushing the bulk of the increased sediment load to the Parsnip River (Anonymous 1984). The Ministry of Environment, Northern Region was not satisfied with the contents of the

Acres Consulting report and objected strongly to the conclusions drawn within (file 75.700101 Ministry of Environment Regional Critique).

Although the 1984 Acres Consulting report claimed that the biological impacts "appear to be of short duration, minor in magnitude, and confined to sections of stream within the first few kilometres downstream of the tunnel construction areas", turbidity levels in the Table River remained high for approximately three years after construction, and detrimental sediment/silt deposition in the Table River mainstem likely remained for many years after. The natural recovery of vegetation, in addition to mitigative techniques such as hydro-seeding, appear to have stabilized the majority of areas where soil erosion occurred as a result of railroad and tunnel construction.

Timber harvest activity within the Table River watershed has impacted fish habitat. Cut blocks and associated access roads extending to the banks of the Table River and numerous tributary streams are common. Logging of the riparian vegetation in many areas of the mainstem and tributaries has caused localized bank instability, resulting in an increase in silt loads and turbidity. Johnston and Slaney (1996) indicate that in areas where sediment sources are directly linked to the stream channel, as is the case in numerous sections of the Table River watershed, large alterations to stream channel structure may occur such as aggradation and channel widening, causing channel de-watering at low flows. In addition, the increased rate of sediment generation and delivery to streams can reduce the productivity of the aquatic ecosystem through direct physiological effects on the biota. Blackman (1995) noted that flood plain and stream bank logging in the Table River may have increased channel widening and migration, and reduced inputs of large woody debris. Harvesting of the riparian vegetation in many areas of the watershed may have also increased water temperatures in the mainstem and nursery streams (Blackman 1995). This rise in temperature could result in an increase in rainbow trout production, at least initially, but would likely be a detriment to bull trout and Arctic grayling populations that prefer cooler water temperatures.

Naturally Occurring Fish Habitat Impacts

Naturally occurring unstable clay/silt banks are common in the lower two thirds of the Table River valley, a vestige of the glacial deposition of lacustrine materials (fine textured clays, silts and sands). Due to the abundant annual rainfall and snowfall characteristic of this watershed, high water events may often lead to an increase in water turbidity, arising from several naturally eroding banks along the mainstem and tributaries. The accumulation of silts and sediments in the slower moving, lower sections of the Table River may be increased by this natural erosion. Industrial activities within the watershed, however, have likely increased the severity and frequency of sediment-related fish habitat impacts.

Fish Habitat Assessment

Reconnaissance Stream Surveys were conducted in the Table River watershed both in 1995 and 1996. In 1995, 5 stream surveys were conducted on the mainstem and 22 sites were surveyed on 15 tributaries. In 1996, no sites were surveyed on the mainstem, although 11 sites were surveyed on 6 different tributaries. The purpose of these surveys was:

1. to identify the presence, distribution and relative abundance of fish species/genera within the watershed; and
2. to classify sites based on biophysical data for interpretation of habitat sensitivity (impact assessment) and capability for fish production.

Table 3a,b shows the data collected at each of the stream survey sites. Since all of these sites were conducted in conjunction with electrofishing, the fish catch data is also presented in Table 3a,b. The exception is site #23 on Tributary 293 where stream survey data was collected but no electrofishing was done.

Level 1 Fish Habitat Assessments (FHA) were also conducted in the Table River watershed in both 1995 and 1996, often in conjunction with the Reconnaissance Stream Surveys. Level 1 FHA were conducted:

1. to confirm/revise the identification of the nature, location, extent and severity of forest harvest impacts on fish habitat;
2. to provide sufficient information to identify and prioritize restoration options, and to identify initial project objectives and scope;
3. to identify the need for any Level 2 Fish Habitat Assessments; and
4. to prepare initial budgets and schedules for restoration projects.

Currently, the first three objectives have been met. Prior to the fourth objective being met, potential restoration sites will be evaluated by stream hydrologists and engineers to determine the most cost effective and long term solutions to the problems. At this time Level 2 Fish Habitat Assessments may also be conducted to provide more detailed, site specific information, where needed, to plan restoration work.

In 1995, 4 sites on the mainstem were surveyed (35,306 m^2) as well as 17 sites on 12 different tributaries (36,964 m^2). In 1996, only 3 sites were surveyed on the mainstem (74,780 m^2); no tributaries were surveyed. The locations of these 24 sites surveyed in 1995 and 1996 are shown on Figure 11. Detailed data collected at each site is shown in Appendix B. A summary of the parameters measured at each site is presented in Table 9. A key defining each parameter follows Table 9.

Using habitat diagnosis guidelines found in Table 5 of Johnston and Slaney (1996), several diagnostic parameters were calculated for Table River mainstem and tributary reaches surveyed in 1995 and 1996. These calculations are summarized in Table 10. The

salmonid habitat condition diagnostics used to evaluate the assessed Table River and tributary reaches include:

1. percent pool by area
2. pool frequency (mean pool spacing)
3. large woody debris (LWD) pieces per bankfull channel width (Wb)
4. percent wood cover by area
5. overhead cover by area

For each habitat diagnostic, the rating of poor, fair or good was given, according to the calculated value. It must be noted here that the diagnostics outlined in Johnston and Slaney (1996) were intended to summarize the fish habitat conditions in coastal watershed channels having widths of less than 15 m. Currently, diagnostic standards for channels > 15 m, and for streams located in the interior of B.C (to accommodate for physiographic and biogeoclimatic differences), are lacking but are currently being developed. Thus, since all but reach #6 on the Table River mainstem, and 4 tributary reaches, have channel widths greater than 15 m, the diagnostic ratings generated in Table 10 are likely to be considerably lower than if regional standards existed and were used. Nevertheless, these diagnostic ratings could be used as a comparison for future Fish Habitat Assessments conducted in other interior watersheds provided future measurements are taken and analyzed consistent with the methods outlined in Johnston and Slaney (1996).

It is also important to note that sites were not surveyed according to a pre-determined experimental design. Sites were selected so as to be well distributed throughout the watershed, close to access points, and representative of the entire reach within which the site was sampled. The selection of representative sites may affect the accuracy of the habitat diagnoses since this method is likely to result in biased estimates of reach characteristics (Johnston and Slaney, 1996). Table 11 shows the survey lengths, the lengths of the surveyed reaches, as well as the percent of the reach length surveyed.

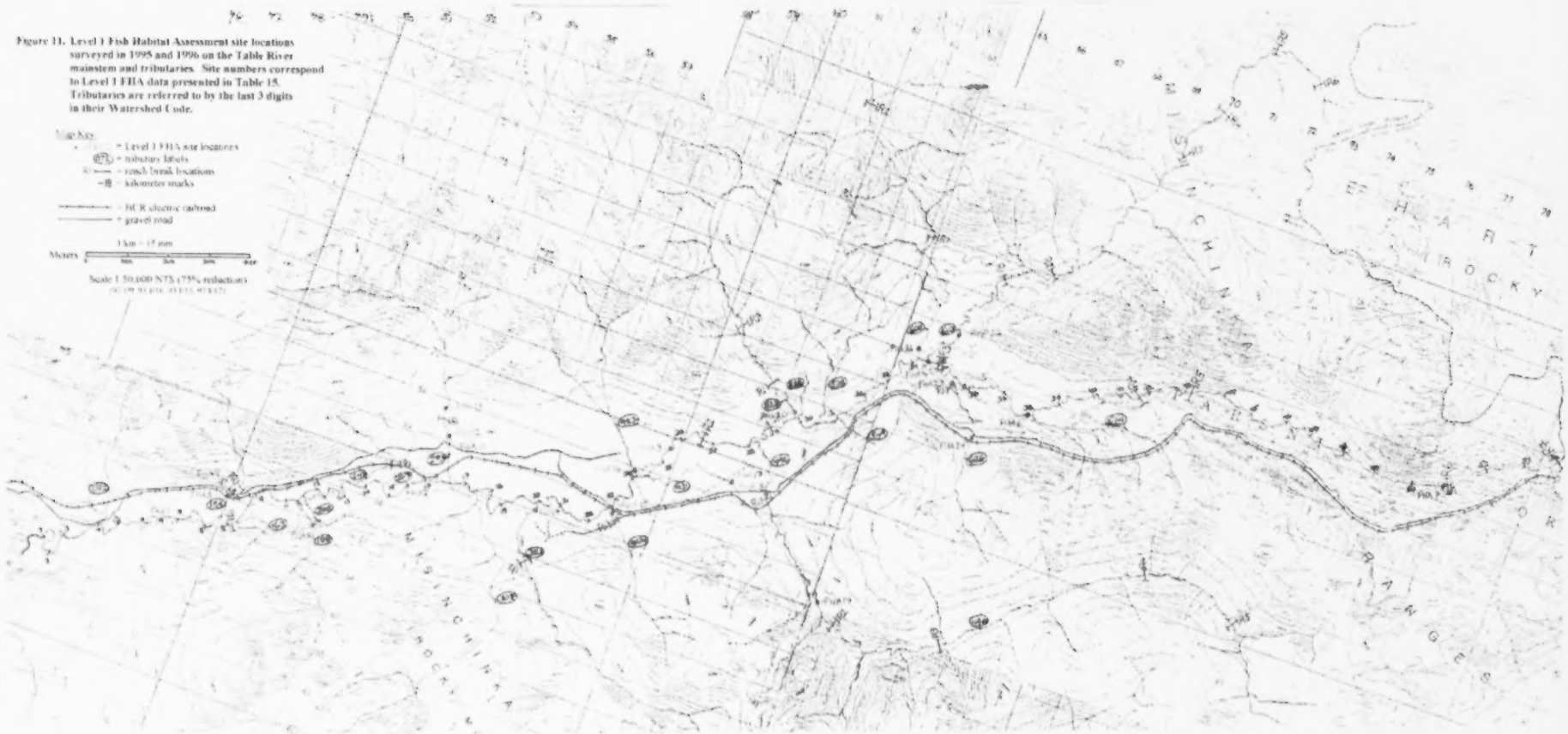


Figure 11. Level 1 Fish Habitat Assessment site locations surveyed in 1995 and 1996 on the Table River mainstem and tributaries. Site numbers correspond to Level 1 FHA data presented in Table 15. Tributaries are referred to by the last 3 digits in their Watershed Code.

Table 10. Habitat diagnosis summary for Table River mainstem and tributary reaches. Generated from Fish Habitat Assessment data (Appendix B). Note: diagnotic ratings must be used with caution, particularly for reaches with a bankfull width greater than 15 m (denoted with *).

Location	Reach No.	% Pools		Pool frequency		Large LWD pieces/Wb		% LWD cover		Overhead cover	
		value	rating	value	rating	value	rating	value	rating	value	rating
Mainstem	1*	15.4	poor	10.1	poor	2.1	good	14.4	fair	1.0	poor
Mainstem	2*	11.3	poor	22.5	poor	2.2	good	6.3	fair	0.3	poor
Mainstem	3*	10.0	poor	6.2	poor	33.2	good	2.3	poor	0.5	poor
Mainstem	4*	5.0	poor	26.5	poor	1.5	fair	20.2	good	6.9	poor
Mainstem	6	28.9	poor	3.6	fair	0.4	poor	7.5	fair	4,9	poor
Trib 154	2	4.0	poor	40.6	poor	0	poor	0.0	poor	19.6	fair
	3	18.9	poor	n/a	n/a	n/a	n/a	8.8	fair	7.5	poor
Trib 199	n/a	10.4	poor	n/a	n/a	n/a	n/a	19.6	fair	54.7	good
Trib 293	1	8.2	poor	10.3	poor	0.5	poor	15.4	fair	9.2	poor
	2	0.0	poor	n/a	n/a	n/a	n/a	0.0	poor	4.5	poor
Trib 353	1	11.5	poor	10.4	poor	0.3	poor	8.0	fair	6.0	poor
Trib 404	1	0.0	poor	n/a	n/a	n/a	n/a	0.0	poor	14.5	fair
Trib 427	1	10.6	poor	n/a	n/a	n/a	n/a	5.1	fair	68.1	good
Trib 431	n/a	17.5	poor	n/a	n/a	n/a	n/a	9.3	fair	43.1	good
Trib 496	1*	10.5	poor	8.0	poor	0.3	poor	0.8	poor	0.8	poor
	3*	0.0	poor	0.0	poor	0.2	poor	5.5	fair	0.0	poor
Trib 527	1	17.9	poor	5.8	poor	0.4	poor	15.2	fair	13.0	fair
Trib 605	1*	20.7	poor	3.3	fair	0.9	poor	5.6	fair	5.5	poor
Trib 610	1*	10.0	poor	10.4	poor	0.1	poor	3.4	poor	3.3	poor
Trib 626	1	12.3	poor	6.5	poor	0.5	poor	7.5	fair	68.8	good
	2	4.2	poor	n/a	n/a	n/a	n/a	0.0	poor	10.1	fair

Table 10a. Habitat diagnosis summary for Table River mainstem and tributary reaches. Generated from Fish Habitat Assessment data (Appendix B). Note: diagnostic ratings must be used with caution, particularity for reaches with a bankfull width greater than 15 m (denoted with *).

Location	Reach No.	Boulder Cover		Substrate	Off Channel	Holding Pools		SpawnerAccess	Gravel Quantity		Gravel Quality
		Value	Rating	Rating	Rating	Value	Rating	Rating	Value	Rating	Rating
Mainstem	1	0	poor	poor	good	15	good	good	0	poor	poor
	2	0	poor	good	fair	17	good	good	3	poor	fair
	3	0	poor	good	fair	10	good	good	6	fair	fair
	4	1	poor	fair	poor	4	poor	good	12	good	good
	6	0	poor	fair	poor	0	poor	poor	7	fair	fair
Trib 154	2	9	poor	good	poor	2	poor	poor	10	good	good
	3	10	fair	fair	poor	0	poor	poor	7	fair	fair
Trib 199	n/a	0	poor	poor	poor	10	poor	poor	11	good	poor
Trib 293	1	12	fair	good	poor	8	poor	good	1	poor	good
	2	27	fair	fair	poor	0	poor	good	1	poor	fair
Trib 353	1	0	poor	fair	poor	11	poor	poor	3	poor	poor
Trib 404	1	36	good	fair	poor	0	poor	good	0	poor	fail-
Trib 427	1	0	poor	poor	poor	11	poor	good	9	fair	poor
Trib 431	n/a	0	poor	poor	fair	17	poor	poor	10	good	poor
Trib 496	1	9	poor	good	poor	10	poor	good	1	poor	fair
	3	1	poor	poor	poor	0	poor	fair	14	good	fair
Trib 527	1	4	poor	fair	poor	18	good	good	1	poor	fair
Trib 605	1	10	fair	good	poor	21	fair	good	3	poor	good
trib 610	1	6	poor	fair	poor	10	poor	good	7	fair	fair
Trib 626	2	0	poor	poor	poor	12	poor	good	10	good	poor

Table 11. Reach lengths, FHA survey site lengths, and percent of reach surveyed for Table River mainstem and tributary reaches.

Location	Reach No.	Reach length (m)	Survey length (m)	Percent Surveyed
Mainstem	1	9100	891	9.8
Mainstem	2	17600	2065	11.7
Mainstem	3	8200	1472	18.0
Mainstem	4	6900	1043	15.1
Mainstem	6	7700	87	1.1
Tributary 154	2	203	203	100
Tributary 154	3	unknown	79	unknown
Tributary 199	unknown	unknown	159.5	unknown
Tributary 293	1	1800	749	41.6
Tributary 293	2	unknown	50	unknown
Tributary 353	1	1560	252	16.2
Tributary 404	1	unknown	159	unknown
Tributary 427	1	unknown	405	unknown
Tributary 431	unknown	unknown	189	unknown
Tributary 496	1	2000	728.5	36.4
Tributary 496	3	3600	128	3.6
Tributary 527	1	1600	169	10.6
Tributary 605	1	3800	394	10.4
Tributary 610	1	4600	540	11.7
Tributary 626	1	360	229	63.6
Tributary 626	2	unknown	166	unknown

Two tributaries do not have established reach breaks (tributaries 199 and 431, Table 11), and reach lengths are not established for 7 tributaries because upstream reach breaks had not been determined. For tributaries with unknown reach lengths diagnostics #2 and #3 (pool frequency and LWD per bankfull channel width, respectively) could not be applied since reach lengths must be known to diagnose a characteristic measured per bankfull width of stream.

Table River Mainstem Reaches

The Table River mainstem reach values are likely the most affected by the lack of appropriate diagnostic standards since the channel width ranged from 18.1 to 48.7 m in reaches #1-4. Although the channel width for reach #6 (12.2 m) fell within the standards, only a very small length of the entire reach was surveyed (1.1%, Table 11), which may have seriously over, or underestimated the diagnostic values and ratings.

Percent pools in all surveyed mainstem reaches was rated as poor, and pool frequency was also ranked as poor for all reaches except reach #6, which was given a fair rating. All channels with a width < 15 m, and having a stream gradient < 2.0% gradient, were given a rating of poor if the percent pool values were < 40%. However, only 8 of 66 reaches surveyed in the Williston Watershed had % pools > 40% (B. Blackman, Peace/Williston Fish and Wildlife Compensation Biologist, MELP, Prince George, BC., pers. comm.).

LWD pieces per channel width was found to be good or fair for reaches #1-4, but poor for reach #6, perhaps due to the short survey length. Percent LWD cover was rated fair to good for all surveyed mainstem reaches. Overhead cover was ranked as poor for all surveyed mainstem reaches, which is not surprising considering the size (bankfull channel width) of the Table River.

Table River Tributary Reaches

Percent pools and pool frequency was rated as poor for all tributary reaches except reach #1 in Tributary 605, which was rated as fair. Only 4 of 16 tributary reaches had channel widths greater than 15m, reach #1 in Tributary 605 being one of them. Thus, it appears that Tributary 605's reach #1 has exceptional pool habitat, and that all other reaches may be lacking valuable pool habitat. Although the number of LWD pieces per channel width in all tributary reaches were rated as poor, the rating for the percent of cover provided by LWD was typically fair. As many of the tributaries have adjacent cut blocks, they may be lacking inputs of large woody debris. Overhead cover in the tributary reaches rated far better than those in the mainstem; half the reaches had a rating of poor, and half were rated fair to good.

A number of areas on the Table River mainstem and tributaries have been identified as having habitat concerns, particularly slumping or failing banks, and beaver activity. Although some of these sites are naturally occurring, many areas have been logged to the stream edge which has produced increased channel migration, failing banks, and associated increases in turbidity and siltation. Areas of beaver activity in a number of tributaries (072, 199, and 431) have blocked off or limited fish access to suitable upstream habitat. Beaver activity has increased along tributaries such as 431 after logging activities returned the riparian forest stand to an early successional stage predominated by preferred beaver food sources such as willows. Table River mainstem and tributary sites with identified habitat concerns are expanded upon in a following section, Habitat Restoration Projects/Evaluations. Measures to restore or rehabilitate habitat degradation are also outlined for each of these sites.

Available Habitat Types

In addition to the Fish Habitat Assessment information collected, the percent rearing habitat for fry, parr, and adult salmonids was also estimated by the PWFWCP (Appendix B). To estimate the percent suitable habitat for each life stage is challenging due to the variety of conditions found in a stream, and can be very observer-dependent. In addition, the life histories and specific habitat uses of the salmonid species inhabiting the Table River watershed are slightly different, thus the percent habitat estimations are very general. The following are rough guidelines used by the field crew to determine percent habitat that is generally suitable for salmonids. Habitat considered suitable for fry rearing was defined as shallow (< 20 cm in depth) with low velocity (0-0.2 m/s), and a

typically cobble/boulder substrate at the lower end of gravel bars or in backwaters. Habitat considered suitable for the rearing of parr was defined as that having a velocity of roughly 0.2-0.4 m/s over a gravel/cobble substrate, with sufficient water depth and cover for the size of fish. Habitat considered suitable for adult rearing was defined as that having a velocity of approximately 0.3-0.6 m/s over gravel/cobble/boulder substrates, with sufficient water depth and cover for the size of fish (B. Blackman, Peace/Williston Fish and Wildlife Compensation Biologist, MELP, Prince George, BC., pers. comm.).

Reaches #1-3 on the mainstem Table River contain the highest percentage of adult rearing habitat in relation to fry and parr rearing habitat. The greatest percent of habitat in mainstem reaches #4 and #6 is suitable for rearing parr, compared to fry and adult rearing habitat. Most of the tributary reaches (13 out of 16 tributary reaches) have a greater percentage of habitat suitable for rearing parr than for rearing fry and adults. The remaining 3 tributary reaches have a higher percentage of adult rearing habitat compared to fry and parr rearing habitat. Therefore, there appears to be less fry habitat available in the mainstem and tributary reaches than parr and adult habitat. Therefore, fry habitat may be a limiting factor for the Table River salmonid populations.

Arctic Grayling Habitat Preference

Arctic grayling were observed only in the mainstem of the Table River between the falls located at km 37.6 and the river mouth (km 0). The falls are a barrier to the upstream migration of the grayling population. No evidence exists to date for the use of tributaries by Table River grayling. Numerous Arctic grayling fry were observed in mainstem side channel habitats in 1996.

The habitat utilization of Arctic grayling in the Table River mainstem was investigated in 1995 and in 1996. This was accomplished by snorkeling sections of the mainstem and taking detailed habitat measurements whenever Arctic grayling were encountered. Not all locations where Arctic grayling were observed were measured, thus density estimates cannot be made from the collected data. Data collected in 1995 are presented in Appendix C (Table C1). Data from 1996 are shown in Table C2 in a summary form similar to the 1995 data. More detailed 1996 results are presented in Tables C3 to C6 (Appendix C). In 1996, the fork lengths of Arctic grayling observed were visually estimated, and ranged from 120-380 mm (mean fork length was 275 mm) (Tables C3-C6).

Mean Depth and Velocity

Table 12 below summarizes the mean water depths and mean water velocities at locations where adult/sub-adult Arctic grayling were observed in the Table River mainstem. In 1995, velocity was measured 10 cm off the substrate (approximate fish location), at 60% of the maximum depth (approximates mean velocity), and at the surface. In 1996, velocity was measured at the depth of the fish, at the surface, and at the point of maximum velocity.

Table 12. Mean water depths and velocities measured at the locations where Arctic grayling were observed in the Table River in 1995 and 1996.

		Mean Velocity (m/sec)			
Survey Year	Mean fish depth (m)	Fish location	60% of max. depth	Surface	Maximum
1995	1.4	0.36	0.62	0.55	-
1996	1.3	0.46	-	0.67	0.94

The mean depth at which Arctic grayling were observed in 1996 (1.3 m) is consistent with that measured in 1995 (1.4 m). In 1995, fish depths ranged from 0.7m to 2.6 m (Table C1), and from 0.9 m to 1.9 m in 1996 (Table C2). Only sub-adult grayling were observed in water less than one metre deep. The mean measurements of velocity taken in 1995 and 1996 at the exact depth of the grayling (0.36 m/sec and 0.46 m/sec, respectively), and at the surface (0.55 m/sec and 0.67 m/sec, respectively), are also very similar. The water velocities at the fish locations ranged from 0 m/sec to 0.69 m/sec in 1995 (Table C1), and from 0.14 m/sec to 0.90 m/sec in 1996 (Table C2). Hughes (1992b), in a study of grayling stream position preference, found that grayling were found most often in pools at water velocities of 0.2 m/sec to 0.5 m/sec. This result is consistent with the mean velocity measured at the grayling location in 1995 and 1996.

Habitat Type Utilization

Adult and sub-adult Arctic grayling were most often observed in small pools or glides containing at least some large woody debris. The grayling were not generally observed directly under the debris or other cover, but typically to a few metres to the side, or behind the debris. The stream position of the grayling was usually situated very close to the thalweg through pools, and stationed approximately 10 cm off the bottom. Hughes and Dill (1990), and Hughes (1992a,b) also found that grayling (especially older, territorial adults) usually selected for stream positions in deep depressions near the centre of current (thalweg).

Comparisons were made of the habitat type selection by Arctic grayling in surveyed mainstem reaches between 1995 and 1996. Habitat types recorded during the survey include: pools, glides (calm water flowing smoothly and gently over shallow to medium depths, with little or no surface turbulence, and with moderately low velocities of 0.1 m/sec to 0.2 m/sec), and runs (deep, fast flowing with a broken surface). Table 13 shows the percent of Arctic grayling observed in each habitat type between 1995 and 1996. In 1995, reaches #1, #3 and #4 were surveyed, and in 1996, reaches #1, #2 and #3 were surveyed. Habitat selections for all reaches are shown, as well as habitat selections for reaches #1 and #3 only so that direct comparisons can be made.

Table 13. Habitat type selection by Arctic grayling in surveyed reaches of the Table River mainstem.

Survey year	Reaches surveyed	Habitat type		
		Glide (%)	Pool (%)	Run (%)
1995	1,3 and 4	35.6 (21)	62.7 (37)	1.7 (1)
	1 and 3	48.9 (21)	48.9 (21)	2.3 (1)
1996	1,2 and 3	51.8 (42)	35.8 (29)	12.3 (10)
	1 and 3	40.5 (15)	56.8 (21)	2.7 (1)

Note: Sample size is shown in brackets beside percentages.

In 1995, over all surveyed reaches, 36% of grayling were observed in glide habitat, 63% in pool habitat, and 2% in run habitat. Over all surveyed reaches in 1996, 52% of grayling were found in glides, 36% in pools, and 12.3% in runs. When only reaches #1 and #3 are compared between years, grayling habitat selection is very consistent, with 49% and 40% grayling found in glides in 1995 and 1996, respectively, 49% and 57% found in pools, respectively, and 2% and 3% found in run habitats, respectively. Run habitats appear to be utilized at low levels in all surveyed reaches in both 1995 and 1996.

Grayling were found most often in pools in a study of grayling stream position preference conducted by Hughes and Dill (1990). In addition, Reynolds (1989) found that pools are the suggested optimal summer habitat for adult Arctic grayling. This finding is supported by Anonymous (1978a) who reported that the preferred adult feeding habitats in summer are pool areas in riffle-pool sequences, often together with rainbow trout.

Preferred Substrates

The dominant and sub-dominant substrate types were recorded at the location of each Arctic grayling observed in 1996 (Table C2). Substrate data for 1995 is incomplete (Table C1). Table 14 shows the percent of Arctic grayling that were observed over each dominant and sub-dominant substrate type combination.

Table 14. Percent use of dominant and sub-dominant substrate types by Arctic grayling in the Table River in 1996.

Dominant substrate type	% use by grayling	Sub-dominant substrate type	% use by grayling
Cobbles (64-256 mm)	46.9 (38)	Gravels	86.8 (33)
		Sand	7.9 (3)
Gravels (2-64 mm)	45.7 (37)	Cobbles	48.6(18)
		Sand	51.4(19)
Sand (< 2 mm)	7.4 (6)	Gravels	100 (6)
		Cobbles	0(0)

Note: Sample size is shown in brackets beside percentages.

Arctic grayling were most often found in habitats where either cobble or gravel was the dominant substrate (47% of grayling were found over cobble dominated substrates, and 46% were found over gravel dominated habitats). Only 7% of grayling were found in habitats where sand was the dominant substrate. For all observations of grayling over cobble dominated substrates, gravels were the sub-dominant substrate in 87% of the cases (33 fish), and sand was the sub-dominant substrate in 8% of cases (3 fish). For all observations of grayling over gravel dominated substrates, cobbles were the sub-dominant substrate in 49% of cases (18 fish), and sand was the sub-dominant substrate in 51% of cases (19 fish). Finally, for all observations of grayling over sand dominated substrates, gravels were the sub-dominant substrate in 100% of the cases (6 fish). Thus, the dominant/sub-dominant substrate combinations used most frequently by grayling observed in the Table River in 1996, were:

1. cobble (dominant) / gravel (sub-dominant),
2. gravel (dominant) / sand (sub-dominant), and
3. gravel (dominant) / cobble (sub-dominant).

Vincent (1962), who compiled a review of Arctic grayling in North America, reported that grayling streams typically have coarse sand and fine gravel bottom substrates.

Habitat Cover

For every grayling observation made during the Arctic grayling habitat utilization survey in 1996, the primary type(s) of fish cover present, if any, were recorded. This data was not recorded during the 1995 surveys. The three types of cover identified during the survey include LWD (functional large woody debris), depth, and surface turbulence. Very little, and often no overhanging riparian cover was present along most Table River mainstem reaches. The percent (and number) of Arctic grayling that utilized each cover type was calculated from the data in Table C2. and is presented in Table 15.

Table 15. Percent use of cover type by Arctic grayling observed in the Table River mainstem in 1996.

Primary Cover Type	% use by grayling
LWD	17.3 (14)
Depth	59.2 (48)
SurfaceTurbulence	21.0 (17)
None	2.5 (2)

Note: Sample size is shown in brackets beside percentages.

Most grayling (48 individuals) were observed in locations where the only existing cover was depth (59%). Twenty-one percent of grayling observed (17 fish) were found in locations where surface turbulence was the only existing cover, 17% of grayling observed (14 fish) were found using LWD as cover. Only 2.5% of grayling were observed (2) in locations where no cover was available. Although it appears that few grayling use LWD as cover, it is possible that an abundance of LWD was simply not present in the reaches

surveyed. The mean percent cover by LWD in reaches #1-4 was 10.8%, and ranged from 2.3 % in reach #3 to 20.2% in reach #4 (Table 10).

Presence of Other Fish Species/Genera

When a grayling was observed during the survey, the presence of other fish species/genera, and their numbers and fork lengths, was recorded (Tables C3-C6). Table 16 shows the percent of grayling observations where the grayling was in close proximity to other fish species/genera.

Table 16. Percent of 1996 Arctic grayling observations where other fish species/genera were present near the location of the grayling.

Other fish species/genera present near grayling	% of grayling observations
mountain whitefish	61.7 (50)
rainbow trout	7.4 (6)
suckers	7.4 (6)
none	23.4 (19)

Note: Sample size is shown in brackets beside percentages.

Arctic grayling were most often observed near mountain whitefish (62% of observations). This is not surprising since the 1995 single pass snorkel survey revealed that mountain whitefish were the most abundant fish species observed over reaches #1-3 (Table 7), the same reaches in which the 1996 Arctic grayling habitat utilization data was collected. Another explanation for Arctic grayling being observed most often with mountain whitefish being present is that the two fish species may preferentially occupy similar habitats. In 23% of grayling observations, no other fish species/genera were present. Equal, but relatively low, numbers of grayling (6 fish) were observed in the vicinity of rainbow trout and suckers.

In addition to recording the presence of other fish species/genera near observed Arctic grayling, the presence of other adult/sub-adult Arctic grayling were also noted (Tables C1 and C2). In 1995, out of 59 grayling observed, 20 grayling (34%) were solitary, 2 were in a group of 2 (3.4%), 29 grayling were in groups of 4-6 (49.2%), and finally 8 grayling were found together (13.6%). In 1996, 31 grayling were solitary (38.3%), 29 were found in groups of 2-3 (35.8%), 13 were found in groups of 4-6 (16%), and again, 8 grayling were found together in a group (9.9%). Thus, since most grayling observed in 1995 were found in groups of 4-6 fish, and most observed in 1996 were found solitary, it appears to matter little to the grayling whether they are solitary, or form groups. Although some grayling longer than 350 mm were observed in small groups, most were found to be solitary. Territoriality of older adult grayling in summer feeding habitats was reported by Hughes and Dill (1990), and Hughes (1992ab).

Migration

A radio tracking project was initiated in August 1996 to investigate the extent of adult Arctic grayling migration to suitable wintering habitat. These migrations, which

can range from a few kilometres to up to 160 km (Tack 1980; Armstrong 1986; Ridder 1991; Fleming 1991), are usually downstream to larger river mainstems. It may be that the Table River Arctic grayling migrate downstream to overwinter in the deep pools of the lower Table River, and the Parsnip River. Further information on preferred spawning, feeding, and overwintering habitat locations will also hopefully be determined by the radio tracking project. In particular, the identification of spawning sites is necessary to determine the importance of the Table River tributaries in the life cycle of Arctic grayling. This information could be of great importance to the successful management and enhancement of the Table River Arctic grayling.

Genetics

An Arctic grayling genetics study was initiated in 1996 within the Williston Reservoir watershed. This project will determine if there are genetically unique grayling stocks within the Table River. Many studies on Alaskan grayling, outlined in Northcote (1993), suggest that there are distinct stock differences in spawning sites, feeding sites, growth rates, and migratory behaviour. Tack (1980) noted however, that at times the different grayling stocks may intermix and migrate from one river system to another. For effective sport fishery management of Arctic grayling in the Williston drainage, knowledge of potential genetically unique stocks and their unique characteristics is necessary for the protection (and rehabilitation if necessary) of important spawning, feeding and wintering grounds, for each stock encountered.

CONCLUSIONS AND RECOMMENDATIONS

Possible Habitat Limitations

As the Fish Habitat Assessment results suggest (Appendix B), limitations of available habitat may be constraining salmonid populations in the Table River watershed. Mainstem reaches #1-3 were found to have more adult salmonid preferred rearing habitat (10% to 42%) than parr and fry rearing habitat (Table 9). Mainstem reaches #4 and #6 were found to have more parr rearing habitat (25% to 44%) than adult or fry rearing habitat. The majority of tributary reaches also had more parr rearing habitat than adult or fry rearing habitat. Thus, fry rearing habitat such as side channels and backwaters may be the habitat type which is most limiting to the Table River salmonid populations.

Fish habitat limitations within the Table River watershed may have resulted from the generation and transportation of silts and sediments from areas of natural and activity-related (logging, road and railway construction) bank erosion. Fine sediments, such as those found in the surficial valley substrate, are particularly damaging in terms of reducing the productivity of the aquatic ecosystem through changes in channel structure and through direct physiological effects on the biota (Johnston and Slaney 1996). Increases in water turbidity can also seriously impair the feeding effectiveness of young grayling fry (Walker 1983; McLeay et al. 1987), and presumably the feeding behaviour of other salmonids. A number of sites within the watershed where bank erosion is producing deleterious amounts of silt have been identified in the following section.

Increased beaver activity is a second factor limiting fish habitat in the Table River watershed. Although beaver dams may increase juvenile rearing habitat by providing cover and lowered flow velocities, high numbers of beaver dams in streams, particularly small, low gradient streams, have been cited as causing problems by blocking migration routes, trapping fish, and raising water temperatures (Vincent 1962). Timber harvest in many areas of the Table River valley, especially near tributary mouths, has resulted in the predomination of beaver preferred, early successional vegetation such as willows in these areas. Beaver dams in tributaries have caused flooding, channel movement, and braiding, which make fish passage through these areas difficult or impossible. On a number of tributaries, beavers have also blocked road culverts. As a result, large areas of suitable fish habitat upstream of these obstructions are currently utilized little or not at all. The establishment of beaver control programs could especially benefit the rainbow trout population which uses tributary habitat extensively.

Timber harvest has also had major impacts on fish habitats in the Table River Watershed. Approximately 30% (4000 ha) of the valley flat has been harvested, and in many areas, the mainstem and tributaries have been logged to the stream bank. In some of these areas, the removal of the riparian vegetation may have contributed to problems such as the reduction of inputs of large woody debris (in turn reducing pool production, cover, and the retention of organic matter), bank instability, and the elimination of protective overstream cover (which may increase water temperatures). The re-establishment of riparian vegetation may benefit the identified tributary sites having these problems. In 1998, a Riparian Assessment is expected to commence in order to assess riparian areas where the riparian function has been lost or impaired as a result of forest harvesting, and to apply rehabilitation procedures to re-establish riparian function as quickly as possible (Anonymous 1996).

Habitat Restoration Projects/Evaluations

Numerous areas in the Table River watershed have been identified, through stream surveys and Fish Habitat Assessments, as having natural and/or activity-related impacts on fish habitat. Seventeen of these sites are located on tributaries, usually near the confluence with the Table River, and two major sites are situated on the mainstem. The following is a description of the sites, including recommendations for future assessment or restoration work in these areas.

Tributary 072

The gravel access road and the railroad cross Tributary 072 approximately 240 m and 500 m upstream of the Table River, respectively. Below this road crossing, Tributary 072 flows undefined through a large wetland area all the way to the Table River mainstem. Access up the tributary from the Table River is limited due to beaver activity and eroding cutbanks on the tributary. Currently there is limited use of Tributary 072 by salmonids below the road crossing and extremely limited use above the road crossing, although the stream above the road crossing does have good fish habitat. A Level 2 Fish Habitat Assessment should be conducted to determine a method of providing access to the tributary from the Table River mainstem.

Tributary 154

The gravel access road and the railroad cross Tributary 154 approximately 650 m and 950 m upstream of the Table River mainstem, respectively. Tributary 154 flows under the road through a culvert which appears to be impassable to fish, then continues downstream through another culvert under the railroad tracks. One rainbow trout was found upstream from the road culvert and several more were found between the road and railroad culverts. Downstream of the railroad culvert a large gravel fan has been created by deposition of bed materials. At this point, adjacent to a clearcut, the channel flows into a large wetland area containing many beaver dams and standing pools. The channel is undefined throughout this wetland area and there is no clear tributary channel entering the mainstem of the Table River. Bordering this wetland area is an area of remnant mainstem side channels which hold water in isolated pools throughout the summer. Under present conditions this tributary has very limited fish production although the fish production potential is high (A. Langston., Peace/Williston Fish and Wildlife Compensation Biologist, MELP, Prince George, BC., pers. comm.). Through control of beaver activity, stream re-channelization, and the implementation of a vegetation management plan, this tributary has the potential to provide several kilometres of highly productive fish habitat.

Tributary 163

A logging road crosses Tributary 163 twice, at approximately 400 m and again at 800 m upstream of the Table River. Tributary 163 is a severely impacted creek. Beaver activity in the valley flat adjacent to numerous cut blocks has totally blocked the channel in many areas. Currently there appears to be no use of this tributary by salmonid species. A Level 2 Fish Habitat Assessment should be conducted on the impacted area to determine the best method of initiating stream re-channelization and other restoration measures. Existing beaver dams should be removed and a beaver control program implemented. In addition, a vegetation management program would bring the area back into conifer production and help reduce beaver activity.

Tributary 199

A small logging road crosses Tributary 199 approximately 600 m upstream of the Table River. Tributary 199 is another small stream which is currently not used by fish mainly due to channel blockages caused by beaver activity. Where the lower stream flows through the valley flat, logging activity has come very close to the riparian area, although the riparian zone has not been logged. This stream would benefit from annual clearing of beaver dams and the implementation of a beaver control program.

Tributaries 243 and 257

The railroad and access road cross both Tributary 243 (at approximately 1.0 km and 1.8 km upstream of the Table River, respectively), and Tributary 257 (at approximately 550 m and 1.1 km upstream of the Table River, respectively). During

ground surveys in the area it was noticed that culverts on both tributaries may be blocked. Follow-up surveys should be conducted to confirm or dismiss this problem.

Tributary 293

The railroad and access road both cross Tributary 293 at approximately 600 m and 1150 m upstream of the Table River. Tributary 293 is a high energy stream which exhibited no signs of beaver activity at the time of survey. The tributary is inhabited by both bull trout and rainbow trout, although fish numbers appear to be well below the stream's carrying capacity. A significant portion of this tributary's drainage has been harvested for timber. The stream has been clear cut down to the banks along it's lower reaches, although the riparian areas upstream from the road crossing appear to be intact. Prior to the re-establishment of the riparian vegetation along the lower reaches of the tributary, several areas of gravel and channel movement need to be assessed.

Tributary 353

No roads or railroad cross Tributary 353. This tributary is another small, high energy system with a large clearcut situated along the east side of it's lower reaches. The gradient of the lower stream is very low (0.6 %), where very limited pool habitat exists. Rainbow trout were found near the tributary mouth but only sculpins were captured higher upstream. Bank stability should be evaluated along the clearcut area, and a watershed restoration specialist should be consulted to determine the most suitable means to create pool habitat.

Tributary 404

Tributary 404 flows through a large clearcut. A road crosses the stream approximately 360 m upstream of the Table River. Although the upper reaches of this tributary appear to be inaccessible to fish due to high gradient, the lower 1-200m could be improved to provide higher fisheries values. A Level 2 Fish Habitat Assessment should be conducted in this area to identify the appropriate restoration options and priorities.

Tributary 427

Tributary 427 is a small high energy system flowing through a large cut block. A road crosses the tributary approximately 700 m upstream of the Table River. The stream crossing (culvert) will soon require significant repairs or removal. Although numerous riparian areas have been impacted by logging, a dense growth of willow and alder provides good riparian cover. This stream has very limited pool habitat (11%) and fish use is very low. The tributary flows into an aggrading side channel of the mainstem Table River, which could be developed to provide excellent rearing habitat. Again, it will be necessary to conduct a Level 2 Fish Habitat Assessment of the lower portion of Tributary 427 in order to plan appropriate rehabilitation activities. Machine access to the aggrading side channel is good, as a road accesses the confluence of Tributary 427 and the Table River mainstem.

Tributary 431

A road crosses Tributary 431 approximately 2.9 km upstream of the tributary mouth. This tributary is a small stream that flows into a large cut block which has a number of old remnant mainstem channels. This area, over 2 km^2, has become a large wetland. As a result, beavers have moved into this area and built dams which have flooded large areas of highly productive timber land, as well as preventing fish access into potentially productive fish habitat. This stream would benefit from the annual clearing of beaver dams, the excavation of drainage channels, and the establishment of a riparian vegetation management plan to prevent further dam construction. In addition, the implementation of a beaver control program may be beneficial, provided a wildlife management plan for the whole watershed is developed in order to take into account habitat use by other wildlife species such as moose and wetland birds.

Tributary 496 (Boulder Creek)

Both the access road and the railroad cross Tributary 496 approximately 1.8 km and 2.2 km upstream of the Table River. This tributary is a large, very high energy system with minimal logging impacts except near the road crossing. There are two very large severe slumps or eroding banks on this stream that will inevitably fail. The lower slump has already failed and will again experience a rotational failure of an estimated 12,000 cubic metres of bank materials. The second slump area, 500 m upstream, is expected to fail during the 1997 spring freshet with an estimated volume of 30,000 cubic metres of bank materials. The upper eroding bank was caused when a debris jam diverted the main flow of the tributary directly into a high clay bank. This jam was removed in 1996 in an attempt to reduce or eliminate the impact of the immanent slope failure. However, a small stream had been diverted during road construction which now flows over the upper cut bank. A Level 2 Fish Habitat Assessment is necessary to determine if this stream could be diverted to enter Tributary 496 at a less critical location. Although these eroding banks are not directly a result of logging activity, the failure of these sites would negatively affect any mainstem restoration work conducted downstream.

Tributaries 527 and 538

Neither tributary 527 nor 538 have suffered any impacts due to logging. As well, no roads cross this tributary. However, Tributary 527 has some areas of bank instability and Tributary 538 has a wetland area near it's mouth that may make fish passage difficult. Although these problems may be of lower priorities compared to impacts on other tributaries, further assessments should eventually be conducted to address specific problems as well as improvement options.

Tributary 605

Although Tributary 605 is bordered by a large cut block for approximately 1-1.5 km of it's length, no roads cross over the tributary. There is one large naturally eroded bank along the clearcut section which is beginning to re-vegetate. Since bank materials in this area are primarily large gravels, cobbles and boulder, bank stability is not a critical

problem. However, further bank stabilization in this area would be desirable. Good numbers of bull trout juveniles have been found in this stream, and large concentrations of Arctic grayling have been encountered where Tributary 605 enters the mainstem. A Level 2 Fish Habitat Assessment could be conducted on this system to determine if bank stabilization work is needed.

Tributary 610

Tributary 610 is crossed by a logging road approximately 1.2 km upstream of the Table River. Clear cuts border the lower reaches of this tributary on both sides. One cutblock is a large area that was salvaged after a massive blowdown event. This tributary has the worst siltation problem in the watershed, with the slightest amount of rainfall resulting in the stream becoming milky with clay. The source of this problem is a large failing clay bank near the upstream end of the cut block. It is highly unlikely that this bank can be stabilized but it may be possible to re-channelize the stream away from the bank failure. This bank failure is naturally occurring but there are a number of serious bank erosion problems in the reach directly adjacent the cut blocks that are attributed to the timber harvest. This stream requires a Level 2 Fish Habitat Assessment to thoroughly evaluate bank stabilization problems. Another problem is a large avulsion that has occured where the Tributary 610 enters the Table River. The avulsion has broken up the main flow of the tributary and has re-directed the channel. This area should be evaluated by a hydrologist to determine if the channel should be re-directed to its original course.

Tributary 626

The access road and railway cross Tributary 626 approximately 2.1 km and 2.2 km upstream from the Table River, respectively. Tributary 626 is a stream very highly utilized by rainbow and bull trout. The stream channel flows through a large cut block, and for a significant section of its fish accessible length, the tributary lacks a riparian zone. This area has re-vegetated fairly well but will lack inputs of large woody debris for many years. In addition, any future gravel deposition near the tributary mouth could cause fish access problems. A Level 2 Fish Habitat Assessment should be conducted in the future to re-assess the above mentioned problems and to identify rehabilitation options.

Table River Mainstem

A large failing bank located at approximately km 36 of the mainstem is directly attributable to logging activities. It may be possible to stabilize this bank but it would require the widening of the channel towards the opposite bank. Alternatively, the mainstem could potentially be diverted through an old channel. A Level 2 Fish Habitat Assessment should be conducted in order to determine the most effective and efficient restoration procedure to implement. A second area of unstable banks is located at approximately km 35 on the mainstem, just downstream from a ford, and adjacent toa large cut block where the river riparian zone is absent. Bank materials consist primarily of gravels and cobbles so siltation is not a severe problem. Although vegetation is slowly becoming established in this area, some bank stabilization effort would speed up the process. Again, a Level 2 survey should be conducted to assess bank stabilization options.

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APPENDIX A

Fish Sampling and Abundance Survey Data

Table A1. Table River mainstem single pass underwater fish count results for 1995. Taken from Zemlak and Langston (in. prep.)

Location (km)	Width (m)	Visibility (m)	Observed Fish Count							Expanded Fish Count						
			BT	GR	MW	RB	SU	NSC	Total/km	BT	GR	MW	RB	SU	NSC	Total/km
36*	20	4.0	0	18	138	2	0	0	316	0	45.0	345.0	5.0	0.0	0.0	395.0
35	20	4.0	0	17	84	0	1	0	102	0	21.3	105.0	0	1.3	0	127.5
34	25	4.0	4	16	167	3	0	0	190	6.3	25.0	261.0	4.7	0	0	296.9
33	24	4.0	2	13	173	3	0	0	191	3.0	19.5	260.0	4.5	0	0	286.5
32	16	4.0	1	15	173	5	0	0	194	1.0	15.0	173.0	5.0	0	0	194.0
31	20	4.0	0	16	217	0	0	0	233	0	20.0	271.0	0	0	0	291.3
30	15	4.0	0	17	162	1	0	0	180	0	17.0	162.0	1.0	0	0	180.0
29	17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
28	22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
27	25	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
26	19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
25	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
24	20	3.5	2	13	448	7	21	0	491	2.9	18.6	640.0	10.0	30.0	0	701.4
23	22	3.5	2	4	72	4	70	0	152	3.1	6.3	113.0	6.3	110.0	0	238.9
22	21	3.5	1	5	81	2	65	0	.154	1.5	7.5	122.0	3.0	98.0	0	231.0
21	22	3.5	1	5	50	1	33	0	90	1.6	7.9	78.6	1.6	52.0	0	141.4
20	30	2.5	0	1	75	0	66	0	142	0	3.0	225.0	0	198.0	0	426.0
19	27	2.5	0	3	20	0	32	0	55	0	8.1	54.0	0	86.0	0	148.5
18	25	2.5	1	1	41	0	19	0	62	2.5	2.5	103.0	0	48.0	0	155.0
17	25	3.0	1	2	112	4	39	0	158	2.1	4.2	233.0	8.3	81.0	0	329.2
16	27	3.0	0	1	60	0	29	0	90	0	2.3	135.0	0	65.0	0	202.5
15	25	3.0	1	1	22	2	53	0	79	2.1	2.1	45.8	4.2	110.0	0	164.6
14	17	3.0	2	2	85	3	29	0	121	2.8	2.8	120.0	4.3	41.0	0	171.4
13	18	3.0	1	0	92	0	24	0	117	1.5	0.0	138.0	0	36.0	0	175.5
12	21	3.0	0	0	53	1	46	0	100	0	0.0	92.8	1.8	81.0	0	175.0
11	30	3.0	0	2	62	0	22	1	87	0	5.0	155.0	0	55.0	2.5	217.5
10	30	3.5	1	1	13	3	32	0	50	2.1	2.1	27.9	6.4	69.0	0	107.1
9	29	3.5	1	2	22	1	6	2	34	2.1	4.1	45.6	2.1	12.0	4.1	70.4
8	29	3.5	0	2	55	9	32	1	99	0	4.1	114.0	19.0	66.0	2.1	205.1
7	26	3.5	0	6	38	4	38	9	95	0	11.1	70.6	7.4	71.0	17.0	176.4
6	31	3.5	0	1	34	2	23	2	62	0	2.2	75.3	4.4	51.0	4.4	137.3
5	17	3.5	0	1	32	2	11	24	70	0	1.2	38.9	2.4	13.0	29.0	85.0
4	32	3.0	0	0	18	3	1	10	32	0	0.0	48.0	8.0	2.7	27.0	85.3
3	32	3.0	1	0	11	2	1	2	17	2.7	0.0	29.3	5.3	2.7	5.3	45.3
2	30	3.0	0	0	9	0	0	0	9	0	0.0	22.5	0	0	0	22.5
1	31	3.0	0	0	8	2	0	0	10	0	0.0	20.7	5.2	0	0	25.8

BT = bull trout GR = Arctic grayling MW = mountain whitefish
RB = rainbow trout SU = suckers NSC = northern squawfish

*36 km - total fish/km and expanded fish counts for km 36-35 have been doubled since only half of this section was surveyed.

Note: km 29 to km 25 was not surveyed due to difficult access.

Table A2. Table River mainstem single pass underwater fish count results from 1996.

Location (km)	Width (m)	Visibility (m)	Observed Fish Count							Expanded Fish Count						
			BT	GR	MW	RB	SU	NSC	Total/km	BT	GR	MW	RB	SU	NSC	Total/km
37.6*	18	3.5	14	12	237	0	0	0	263	18.1	15.5	305.7	0	0	0	339.3
37	18	3.5	0	18	146	0	0	0	164	0	23.1	187.8	0	0	0	210.9
36	15	3.5	2	9	10	0	0	0	21	2.1	9.63	10.7	0	0	0	22.5
35	19	3.5	2	13	456	0	0	0	471	2.7	17.6	618.8	0	0	0	639.1
34	22	3.5	0	20	168	0	0	0	188	0	31.4	263.8	0	0	0	295.2
33	22	3.5	1	21	229	1	0	0	252	1.6	33.0	359.5	1.6	0	0	395.6
32	(23)	3.0	0	11	434	0	0	0	445	0	21.1	833.3	0	0	0	854.4
31	(23)	3.0	2	10	300	0	0	0	312	3.8	19.2	576.0	0	0	0	599.0
30	23	3.0	0	16	178	0	0	0	194	0	30.7	341.8	0	0	0	372.5
29	(25)	3.0	2	26	497	0	1	0	525	4.2	54.1	1033.8	0	2.1	0	1092.0
28	(25)	3.0	0	2	42	0	1	0	44	0	4.2	87.4	0	2.1	0	91.5
27	(25)	3.0	2	11	353	0	3	0	369	4.2	22.9	734.2	0	6.2	0	767.5
26	32	3.0	2	17	418	1	29	0	467	5.3	45.4	1116.1	2.7	77.4	0	1246.9
25*	(35)	3.0	1	5	168	1	0	0	218.7	3.6	18.2	612.4	3.6	0	0	637.7

BT = bull trout GR = Arctic grayling MW = mountain whitefish
RB = rainbow trout SU = suckers NSC = northern squawfish

37.6 km - note that the Total fish/km and Expanded fish counts for km 37.6-37 represent only 0.6 km of this section since a set of falls are situated upstream of 37.6 km.

25 km - Total fish/km and expanded fish counts for km 25-24 have been corrected for since only 0.8 km of this section was surveyed.

(width) - stream width measurements in parentheses are estimates and thus expanded counts may be inaccurate.

Table A3. Beach seine data collected from July to September 1996 in the Table River mainstem.

Stream reach #	Location	Date (y/m/d)	Fish Caught				Temp. (°C)	Seine surface area (m^2)	Max. depth (m)	Mean depth (m)	Substrate				Habitat type	Velocity (m/s)	Cover	
			species	#	mean length (mm)	mean weight (g)					fines (%)	gravels (%)	cobbles (%)	boulder			Type	(%)
1	km 0	96/09/01	none				11.0	840	1.2	0.4	80	20	0	0	G	0.5	D	
1	km 1.6	96/09/01	MW	2				702	0.7	0.4	10	90	0	0	G	0-1.0	none	
			CC	4														
			GR	6	140.2	29.6												
1	km 2.9	96/09/01	CC	6			10.0	360	0.7	0.3	10	90	0	0	SP	0.0		
			MW	21	53.0													
1	km 3.0	96/09/01	GR	1	184.0	70.4		900	0.7	0.4	10	80	10	0	G	0.5	none	
1	km 3.4	96/09/01	CC	17				1378	0.4	0.2	10	90	0	0	G		none	
			MW	2														
			RB 0+	2	30.0													
			SP?	3														
1	km 3.8	96/09/01	none					1760	0.6	0.3	10	90	0	0	G	1.5	OV	5
1	km 3.9	96/09/01	CC	3			9.5	748	0.3	0.2	10	80	10	0	R	fast	ST	
1	km 4.3	96/09/01	MW	8			9.0	816	1.0	0.5	20	80	0	0	G/P	0-0.5	none	
			CC	5														
			GR	1	95.0	7.2												
1	km 5.0	96/07/31	CC	2			11.0	1290	1.2	0.6	20	80	0	0	G	1-2		
1	km 5.1	96/07/31	none					900	0.8	0.5	10	90	0	0	G	1-2	none	
1	km 6.1	96/07/31	MW	21	95.0			595	0.6	0.3	20	70	10	0	G/R	0.0	none	
			CC	1														
1	km 6.3	96/07/31	MW	3	120.0			348	0.8	0.4	20	80	0	0	G	0.5-1		
			GR	1	169.0	49.5												
1	km 6.4	96/07/31	MW	8	55.0			405	1.3	0.7	90	10	0	0	G/P	0-0.5		
			GR	1	226.0	122.0												
1	km 6.5	96/07/31	MW	7	75.0		10.0	546	1.2	0.6	60	40	0	0	G/P	0-0.5		
			CC	1														
1	km 8.0	96/07/31	CC	8			10.5	522	1.9	1	90	10	0	0	G	0.0	none	
			MW	7														
1	km 8.4	96/07/31	MW	1	43.0		10.5	636	1.4	0.9	30	70	0	0	G	0.5	none	
1	km 9.0	96/07/31	CC	4				924	1.0	0.5	30	70	0	0	G	low		
			MW	8														
			GR	1	172.0	48.5												
1	km 9.1	96/07/31	CC	5				720	0.5	0.3	10	80	10	0	G	1.0 +	none	
			GR	1	114.0	13.9												
1	km 9.4	96/07/31	CC	10+	30.0 est.		10.5	3510	0.6	0.4	35	60	5	0	G	1.0	none	
			GR	1	96.0	8.6												
1	km 9.6	96/07/31	MW	1+			10.5	1950	0.8	0.4	30	40	30	0	G	0.5-1.0	none	
			CC	6+														

Dj = debris jam
ST = surface turbulance
OV = overhanging vegetation
D = depth cover (pool)
B = boulder

R = riffle
P = pool
G = glide
SP = side pool

GR = Arctic grayling
MW = mountain whitefish
RB = rainbow trout (RB 0+ = young-of-the-year)
CC = sculpins
SP? = unidentified species

Table A3 (continued). Beach seine data collected from July to September 1996 in the Table River mainstem.

Stream reach #	Location	Date (y/m/d)	Fish Caught				Temp. (°C)	Seine surface area (m^2)	Max. depth (m)	Mean depth (m)	Substrate				Habitat type	Velocity (m/s)	Cover	
			species	#	mean length (mm)	mean weight (g)					fines (%)	gravels (%)	cobbles (%)	boulder			Type	(%)
2	km 23.47	96/07/25	none				13.0	450	2.0									
2	km 23.5	96/07/25	MW	3	226		13.0	270	2.5									
2	km 23.6	96/07/25	CC MW RB SP?	9 9 1 2	 194.0	 74.4	11.0	420		0.3								
2	km 23.8	96/07/25	CC MW SP?	9 16 2	195.0 96.0	76.5 8.3		360		1.5								
2	km 23.9	96/07/25	CC	5	20.0			360										
2	km 24	96/07/25	none				10.0	300	1.2	0.5	30	30	40	0	G/R	0.5-1.0	none	
			GR	1	258.0	170.0												
3	km 25.6	96/09/08	GR MW CC	3 11 1	 30.0		13.0	480	1.5	1.2	0	90	10	0	P/Dj	0.0	D	40
3	km 25.9	96/09/08	none					455	0.8	0.4	10	30	60	0	G	0-0.5	none	
3	km 26.15	96/09/08	none				12.5	400	0.6	0.5	30	40	25	5	G	1-2	D, B	5
3	km 26.3	96/09/08	CC MW	1 1				320	0.9	0.5	10	80	10	0	G	1.0	none	
3	km 26.4	96/09/08	CC	1			13.0	180	1.3	0.7	0	10	70	20	G	0-0.5	D, B	
3	km 26.6	96/09/08	none				11.5	256	0.7	0.4	10	70	30	0	G/R	0-1.5	none	
3	km 27.0	96/09/08	CC	2				1164	0.6	0.4	10	50	40	0	R	1.0	none	
3	km 27.3	96/09/08	none					710			20	55	20	5	R	1.0	none	
3	km 27.8	96/09/08	none				10.5	585	0.4	0.3	20	60	20	0	G	0.5	none	
3	km 28.1	96/09/07	MW CC	1 1	25.0		11.0	960	1.5	0.4	10	50	40	0	G	0.8	none	
3	km 28.5	96/09/07	MW CC	7 1				1000	1.2	0.3	30	35	35	0	G	1.0	none	
3	km 28.7	96/09/07	MW	1	25.0		10.0	315	2.0+	0.5	70	25	5	0	G/P	0.8	D	20
3	km 28.8	96/09/07	none					266	1.2	0.4	50	45	5	0	G	0.3	none	
3	km 29.1	96/09/07	CC	1			9.5	240	1.0	0.4	60	30	10	0	G	0.5	none	
3	km 29.5	96/09/07	MW	3	25.0			252	1.3	0.4	50	30	20	0	G	0.8	none	
3	km 29.8	96/09/07	none					264	0.9	0.3	50	40	10	0	G	0.8	none	
3	km 29.95	96/09/07	none				9.0	262	1.5	0.5	20	50	30	0	G	0.8	none	
3	km 30.3	96/09/07	none					400	0.6	0.25	40	50	10	0	G	0.5	none	
3	km 31.5	96/09/07	MW CC	1 3	25.0		8.0	400	0.8	0.4	20	60	20	0	G	1.0	none	

APPENDIX B

Fish Habitat Assessment Data

(UTM coordinates are given in NAD 27 format)

SYSTEM: Table River
SITE: Mainstem (7 km to 6 km)
DATE: August 9, 1996

U.T.M.: 10.548921.6064020
MAP SHEET: 93 J/9
REACH #: 1

WATER TEMPERATURE: 12.0°C
CREW: A.L./ R.Z./ S.K./ B.P./ J.F./ D.I.
WATERSHED CODE: 236 - 4508 - 000 - 000

STREAM PARAMETERS										% SP.	SUBSTRATE			% REARING HABITAT			% COVER							PIECES OF LWD		
Habitat Type	Length (m)	Wetted Width	Channel Width	Mean Depth	Max. Depth	Riffle Crest	Element	Rise (cm)	Run (m)	HABITAT	D-90 (cm)	Dominant	Subdom.	Fry	Parr	Adult	Deep Pool	LWD	SWD	Bldr.	Cut Bank	Over Hang	Crown Closure	10-20 (cm)	20-50 (cm)	50+ (cm)
R	98	44	47	55	93			31	98		10	G	C	5	15	10	0	1	0	0	0	5	0	26	25	1
G	31	34	39	30	75			15	51		10	G	C	10	10	10	0	0	0	0	0	0	0	7	9	2
RG	80	18	38	30	100			23	80		12	G	C	25	30	10	0	0	1	0	0	0	0	1	6	0
G	70	25	46	100	180			2	70		4	G	F	5	20	70	50	20	0	0	0	0	0	7	4	0
P	90	18	24	150	330	50	LWD	0	90		2	F	G	20	90	70	80	30	10	0	0	0	0	21	38	16
RG	100	26	36	100	225			5	100		6	G	F	5	30	70	10	60	0	0	0	0	0	10	4	1
SR	16	35	42	30	50			3	16		15	G	C	5	10	10	0	10	0	0	0	0	0	5	3	0
SP	75	24	32	140	360	50	LWD	0	75		6	F	G	5	30	80	60	20	10	0	0	0	0	12	16	6
RG	94	17	25	60	230			10	94		10	F	C	10	30	10	10	5	5	0	0	0	0	21	38	16
G	74	27	35	100	300			6	74		6	G	C	5	20	50	30	10	0	0	0	0	0	17	8	0
R	24	18	48	50	80			15	24		7	G	C	10	20	30	0	1	0	0	0	0	0	3	0	0
G	25	18	48	100	200			5	25		8	F	G	15	35	50	40	10	0	0	5	0	0	0	1	0
G	94	20	110	80	190			9	94		8	F	G	10	20	70	60	1	10	0	0	0	0	1	2	0

Length (m)	891.0	Fry Rearing Habitat	9%	1967 m²	Total Rise (cm)	124.0	AVAILABLE COVER BY TYPE	
Mean Wetted Width (m)	24.9	Parr Rearing Habitat	27%	5935 m²	Total Run (m)	891.0	Deep Pool	25.2% 5578.2 m²
Mean Channel Width (m)	44.1	Adult Rearing Habitat	42%	9253 m²	Gradient (%)	0.1	LWD	14.4% 3202.9 m²
Mean Max. Depth (cm)	185.6	Area of pool	15%	3422 m²	# pieces LWD / 100 m² (10-20 cm)	0.6	SWD	2.8% 624.3 m²
Surface Area (m²)	22174	Area of glide	45%	10069 m²	# pieces LWD / 100 m² (20-50 cm)	0.7	Boulder	0.0% 0.0 m²
Area of Spawning Habitat (m²)	0.0	Area of riffle	39%	8687 m²	# pieces LWD / 100 m² (50+ cm)	0.2	Cut Bank	0.1% 22.5 m²
Spawning Habitat (%)	0.0	Area of cascade	0%	0 m²	Mean D-90 (cm)	8.4	Overhang	1.0% 215.6 m²
Area of habitat > 1 m depth (m²)	5578.2	Mean Max. Pool Depth	330.0 cm				Crown Closure	0.0% 0.0 m²

Note: no measurements of spawning habitat were taken at this Level 1 site.

SYSTEM: Table River | U.T.M.: 10.55405.606666 | REACH #: 2 | WATER TEMPERATURE: 8.0°C

SITE: mainstem (16 km to 15 km) | (Nad 27) | DATE: September 24, 1995 | CREW: J.F. / S.K. / A.L.

LOCATION: on the mainstem, from km 16 and worked d/s to km 15 | WATERSHED CODE: 236 - 4508

STREAM PARAMETERS										% SP.	SUBSTRATE			% REARING			% COVER							PIECES OF LWD		
Habitat	Length	Wetted	Channel	Mean	Max.	Riffle	Element	Rise	Run	HABITAT	D-90	Dominant	Subdom.	HABITAT			Deep	LWD	SWD	Bldr.	Cut	Over	Crown	10-20	20-50	50+
Type	(m)	Width	Width	Depth	Depth	Crest		(cm)	(m)		(cm)			Fry	Parr	Adult	Pool				Bank	Hang	Closure	(cm)	(cm)	(cm)
R	210	28	50	30	60			0	210	0	20	C	G	20	30	60	0	0	0	0	0	0	0	2	5	1
G	124	25	43	60	90			0	124	0	15	C	G	10	50	70	0	0	0	0	0	0	0	3	3	0
R	65	22	35	40	70			0	65	0	15	C	G	10	30	10	0	0	0	0	0	0	0	6	2	0
G	107	26	46	60	100			0	107	0	12	C	G	10	50	60	0	0	0	0	0	0	0	3	8	0
G	186	26	43	50	100			0	186	0	8	G	C	10	30	30	0	0	0	0	0	0	0	2	4	0
P	143	27	32	150	300	30	7	0	143	5	25	G	C	10	30	90	70	0	0	0	0	0	0	2	3	1
R	46	32	49	20	100			0	46	30	8	G	C	10	40	10	0	0	0	0	0	0	0	0	0	0

Length (m)	881.0	Fry Rearing Habitat	13%	2924 m²	Total Rise (cm)	0.0	AVAILABLE COVER BY TYPE		
Mean Wetted Width (m)	26.5	Parr Rearing Habitat	36%	8332 m²	Total Run (m)	881.0	Deep Pool	11.6%	2702.7 m²
Mean Channel Width (m)	43.0	Adult Rearing Habitat	54%	12583 m²	Gradient (%)	0.0	LWD	0.0%	0.0 m²
Mean Max. Depth (cm)	117.1	Area of pool	17%	3861 m²	# pieces LWD / 100 m² (10-20 cm)	0.1	SWD	0.0%	0.0 m²
Surface Area (m²)	23361.0	Area of glide	46%	10718 m²	# pieces LWD / 100 m² (20-50 cm)	0.1	Boulder	0.0%	0.0 m²
Area of Spawning Habitat (m²)	634.7	Area of riffle	38%	8782 m²	# pieces LWD / 100 m² (50 + cm)	0.0	Cut Bank	0.0%	0.0 m²
Spawning Habitat (%)	2.7	Area of cascade	0%	0 m²	Mean D-90 (cm)	15.6	Overhang	0.0%	0.0 m²
Area of habitat > 1 m depth (m²)	2702.7	Mean Max. Pool Depth	300.0 cm				Crown Closure	0.0%	0.0 m²

SYSTEM: Table River
SITE: Mainstem (26 km to 25 km)
DATE: August 15-16, 1996

U.T.M.: 10 559811 6070218
MAP SHEET: 93 J/16
REACH #: 2

WATER TEMPERATURE: 12.0°C
CREW: A.L./ R.Z./ B.F / D.I.
WATERSHED CODE: 236 - 4508 - 000

STREAM PARAMETERS											% SP.	SUBSTRATE			% REARING HABITAT			% COVER							PIECES OF LWD		
Habitat Type	Length (m)	Wetted Width		Channel Width	Mean Depth	Max. Depth	Riffle Crest	Element	Rise (cm)	Run (m)	HABITAT	D-90 (cm)	Dominant	Subdom.	Fry	Parr	Adult	Deep Pool	LWD	SWD	Bldr.	Cut Bank	Over Hang	Crown Closure	10-20 (cm)	20-50 (cm)	50+ (cm)
G	28	36	1008	40	30	90			0	28	10	12	G	F	20	70	10	0	0	0	0	0	0	0	0	0	1
SR	33	15	495	40	40	90			4	33	0	15	C	G	1	10	1	0	0	0	0	0	0	0	0	0	0
SG	57	15	855	40	40	100			0	57	0	12	C	G	5	10	1	0	0	0	0	0	0	0	2	0	1
SR	17	14	238	40	20	50			5	17	0	12	C	G	1	1	0	0	0	0	0	0	0	0	0	0	0
SG	36	18	648	40	50	200			1	36	0	12	C	G	20	70	40	20	10	0	0	10	10	10	1	1	4
SR	42	11	462	40	25	60			25	42	0	14	G	C	0	5	10	0	10	0	0	1	1	5	1	0	3
G	83	23	1909	41	40	60			2	83	0	14	C	F	5	10	10	0	5	0	0	1	1	1	1	2	2
R	20	24	480	41	25	50			7	20	0	14	C	G	5	10	0	0	0	0	0	0	0	0	2	1	1
G	24	26	624	45	50	100			6	24	0	12	G	C	5	20	20	0	0	0	0	1	0	5	5	4	0
G	52	16	832	41	40	100			23	52	10	10	C	G	1	10	20	0	20	10	0	0	0	0	12	11	4
R	36	19	684	35	20	60			14	36	0	10	G	C	0	0	0	0	0	0	0	0	0	0	3	3	1
G	17	19	323	79	60	100			5	17	0	4	G	F	0	40	80	0	0	0	0	0	0	0	0	3	3
P	76	22	1672	52	175	205	60	DJ	4	76	75	4	F	G	40	60	90	80	20	20	0	0	0	0	17	22	13
G	187	26	4862	45		180			21	187	10	15	C	G	5	30	20	0	5	0	0	0	0	0	11	9	19
R	39	29	1131	35	40	80			6	39	0	13	C	G	0	10	0	0	0	0	0	0	0	0	2	1	3
G	129	32	4128	35	70	210			2	129	0	15	G	C	5	25	30	10	5	0	0	0	0	0	11	7	9
G	63	15	945	49	80	185			34	63	0	15	G	C	0	10	50	30	20	5	0	0	0	0	12	12	9
R	16	24	384	40	30	50			21	16	0	15	C	G	0	0	0	0	0	0	0	0	0	0	4	2	1
G	15	17	255	44	60	90			4	15	5	12	G	C	0	20	20	0	0	0	0	0	0	0	1	1	2
G	214	33	7062	35	80	250			6	214	0	12	G	C	5	30	40	20	5	0	0	0	0	0	15	22	20

Length (m)	1184.0	Fry Rearing Habitat	27%	7767 m²	Total Rise (cm)	190.0	AVAILABLE COVER BY TYPE			
Mean Wetted Width (m)	29.0	Parr Rearing Habitat	27%	7767 m²	Total Run (m)	1184.0	Deep Pool	12.3%	3575.9 m²	
Mean Channel Width (m)	48.7	Adult Rearing Habitat	28%	8224 m²	Gradient (%)	0.2	LWD	6.3%	1828.5 m²	
Mean Max. Depth (cm)	115.5	Area of pool	6%	1674 m²	# pieces LWD / 100 m² (10-20 cm)	0.3	SWD	1.6%	464.9 m²	
Surface Area (m²)	28997	Area of glide	81%	23453 m²	# pieces LWD / 100 m² (20-50 cm)	0.3	Boulder	0.0%	0.0 m²	
Area of Spawning Habitat (m²)	766.6	Area of riffle	13%	3874 m²	# pieces LWD / 100 m² (50+ cm)	0.3	Cut Bank	0.3%	94.8 m²	
Spawning Habitat (%)	2.6	Area of cascade	0%	0 m²	Mean D-90 (cm)	14.9	Overhang	0.3%	88.5 m²	
Area of habitat > 1 m depth (m²)	3575.9	Mean Max. Pool Depth	205.0 cm				Crown Closure	0.5%	135.2 m²	

SYSTEM: Table River
SITE: Mainstem (35 km to 24 km)
DATE: August 13-14, 1996

U.T.M.: 10 565351 6074207
MAP SHEET: 93 I/13
REACH #: 3

WATER TEMPERATURE: 12.0°C
CREW: A.L. / R.Z. / B.F. / D.I. / S.K. / I.F.
WATERSHED CODE: 236 - 4908 - 000

STREAM PARAMETERS										% SP.	SUBSTRATE			% REARING			% COVER							PIECES OF LWD		
Habitat Type	Length (m)	Wetted Width	Channel Width	Mean Depth	Max Depth	Riffle Crest	Element	Rise (cm)	Run (m)	HABITAT	D-90 (cm)	Dominant	Subdom.	HABITAT Fry	Parr	Adult	Deep Pool	LWD	SWD	Bldr.	Cut Bank	Over Hang	Crown Closure	10-20 (cm)	20-50 (cm)	50+ (cm)
G	45	12	26	40	80			20	45	10	31	C	G	5	20	30	0	10	0	0	0	0	0	2	11	1
R	47	11	21	30	60			37	47	0	20	C	G	1	10	10	0	10	0	0	1	1	10	3	14	2
P	33	17	23	30	140	40	LWD	12	33	5	10	G	C	30	10	40	10	10	1	0	0	5	5	5	2	2
R	22	19	25	20	70			19	22	0	15	C	G	0	5	10	0	20	0	0	0	0	0	9	5	7
SP	6	12		50	100	80	DI	0	6	0	5	F	G	80	80	50	0	30	20	0	0	0	0	1	3	3
G	16	13	22	50	100			15	16	10	18	G	C	1	10	60	10	10	1	0	0	0	1	1	1	0
G	40	12	22	40	100			20	40	10	15	G	C	20	10	20	0	1	0	0	1	1	10	9	2	0
R	37	12	19	30	90			13	17	0	18	C	G	0	10	1	0	5	0	0	0	0	0	1	5	0
G	35	15	19	30	60			14	35	10	12	G	C	15	10	20	0	5	0	0	0	0	5	4	4	2
R	33	10	18	40	80			37	33	0	23	C	G	10	5	0	0	0	0	0	0	0	0	0	3	0
G	46	12	18	30	90			17	46	30	10	G	C	15	20	20	0	5	5	0	0	0	3	1	5	1
R	34	11	60	4	80			23	34	0	10	G	C	0	10	0	0	20	1	0	0	0	0	1	9	1
P	18	8.5	60	110	150	30	LWD	2	18	20	9	G	F	5	20	80	50	50	5	0	0	0	0	1	3	1
R	25	15	35	30	70			5	25	10	12	G	C	0	5	0	0	10	0	0	0	0	0	0	2	0
G	52	22	23	40	90			10	52	10	15	G	F	15	20	30	0	0	1	0	0	3	10	10	10	6
R	88	26	28	20	50			48	88	0	16	G	C	0	20	0	0	0	0	0	0	1	5	6	1	0
P	47	22	30	150	230	80	TRIB	14	47	10	12	G	C	5	30	80	80	0	0	0	0	0	0	3	4	0
G	28	31	35	50	120			15	28	20		G	F	1	30	30	5	0	0	0	0	0	0	0	1	0
R	13	13	47	20	50			27	13	0	20	C	G	0	0	0	0	0	0	0	0	0	0	9	2	0
G	74	12	56	30	50			70	74	0	20	C	G	10	10	1	0	0	0	0	1	5	5	11	21	5
P	54	10	51	80	150	50	DI	5	54	10	20	F	C	10	20	40	30	20	10	0	0	0	5	25	35	6
R	30	13	35	50	80			14	30	0	12	C	G	1	10	5	0	10	0	0	0	0	0	5	2	4
SR	23	11	47	20	40			59	23	0	25	C	G	0	0	0	0	0	0	1	0	5	5	4	5	0
SG	19	8	56	50	80			17	19	0	20	C	G	0	10	0	0	0	0	0	0	0	0	0	1	1
SG	34	9	56	60	130			6	34	10	20	G	C	1	20	30	5	15	0	0	0	0	0	9	18	4
SG	22	11	51	30	70			14	22	0	14	C	G	0	10	10	0	0	5	0	1	0	0	3	6	1
SG	54	13	35	40	80			29	54	0	20	C	G	5	20	10	0	0	0	0	0	0	0	7	8	1
R	106	12	26	40	50			47	106	0	20	C	G	5	10	10	0	0	0	0	0	0	0	3	7	3
G	59	16	32	40	90			4	59	20	25	C	G	5	20	20	0	15	0	0	0	0	0	4	4	2
RG	10	16	32	30	60			5	10	0	25	C	G	0	10	5	0	0	0	0	0	0	0	2	0	0
G	117	28	59	60	145			41	117	10	10	G	F	15	60	30	10	1	0	0	0	0	0	3	5	2
R	52	25	59	20	50			46	52	0	10	C	G	10	10	0	0	0	0	0	0	0	0	2	4	4
G	35	19	100	50	80			0	35	5	14	C	G	0	20	20	0	5	0	0	0	0	5	0	2	3
R	17	17	100	30	60			18	17	0	14	C	G	5	10	20	0	30	0	0	0	5	5	1	1	0
G	31	12	100	40	70			14	31	0	12	C	G	0	10	5	0	0	0	0	1	0	0	2	3	0
R	10	14	100	30	40			10	10	0	12	C	G	0	0	0	0	0	0	0	0	0	0	0	4	1
G	17	11	60	60	100			0	17	0	12	G	C	0	10	50	5	0	5	0	0	1	5	1	3	2
G	63	11	65	70	130			6	63	5	10	G	C	10	30	20	10	0	0	0	0	5	0	5	1	0

Length (m)	1472.0	Fry Rearing Habitat	8%	1791 m²	Total Rise (cm)	733.0	AVAILABLE COVER BY TYPE		
Mean Wetted Width (m)	18.0	Parr Rearing Habitat	8%	1888 m²	Total Run (m)	1472.0	Deep Pool	4.2%	980.6 m²
Mean Channel Width (m)	47.3	Adult Rearing Habitat	10%	2247 m²	Gradient (%)	0.5	LWD	2.3%	545.5 m²
Mean Max. Depth (cm)	88.6	Area of pool	10%	2360 m²	# pieces LWD / 100 m² (10-20 cm)	0.6	SWD	0.3%	72.5 m²
Surface Area (m²)	23609	Area of glide	54%	12808 m²	# pieces LWD / 100 m² (20-50 cm)	0.9	Boulder	0.0%	0.0 m²
Area of Spawning Habitat (m²)	1497.4	Area of riffle	36%	8441 m²	# pieces LWD / 100 m² (50+ cm)	0.3	Cut Bank	0.0%	10.0 m²
Spawning Habitat (%)	6.3	Area of cascade	0%	0 m²	Mean D-90 (cm)	17.7	Overhang	0.5%	118.1 m²
Area of habitat > 1 m depth (m²)	980.6	Mean Max. Pool Depth	167.5 cm				Crown Closure	1.7%	412.5 m²

SYSTEM: Table River | U.T.M.: 10.56594.607377 | REACH #: 4 | WATER TEMPERATURE: 5°C

SITE: mainstem (35 km) (NAD 27) | DATE: Sept. 19, 1995 | CREW: J.C. / S.K.

LOCATION: at bridge out, working upstream (from 35.6 km to 36.1 km) | WATERSHED CODE: 236 - 4508

STREAM PARAMETERS										% SP.	SUBSTRATE			% REARING			% COVER							PIECES OF LWD		
Habitat	Length	Wetted	Channel	Mean	Max.	Riffle	Element	Rise	Run	HABITAT	D-90	Dominant	Subdom.	HABITAT			Deep	LWD	SWD	Bldr.	Cut	Over	Crown	10-20	20-50	50+
Type	(m)	Width	Width	Depth	Depth	Crest		(cm)	(m)		(cm)			Fry	Parr	Adult	Pool				Bank	Hang	Closure	(cm)	(cm)	(cm)
R	40	12	19	15	40			5	40	0	8	C	G	10	20	20	0	10	10	0	0	0	20	3	6	0
G	30	9	19	40	100			0	30	0	8	C	G	10	40	40	10	10	10	0	0	10	50	3	5	1
P	15	15	19	100	150	10	LWD	0	15	10	10	C	F	30	60	60	50	30	30	0	0	10	0	8	14	4
R	28	7	26	25	60			6	28	0	18	C	G	5	15	5	0	0	0	0	5	5	0	0	0	0
G	32	11	23	60	100			0	32	50	10	G	C	20	50	40	10	20	20	0	0	0	0	5	6	3
R	45	10	20	25	40			0	45	0	6	C	G	10	15	0	0	0	0	0	0	5	0	0	0	0
G	25	8	14	40	100			0	25	30	4	G	F	10	40	30	30	20	20	0	0	10	10	4	8	1
R	23	12	14	15	25			0	23	0	4	C	G	5	10	0	0	10	10	0	0	0	0	11	11	1
G	24	10	20	30	80			0	24	10	8	F	C	30	50	40	10	40	10	0	0	10	10	8	6	3
R	12	9	12	20	30			0	12	0	8	C	G	0	10	0	10	10	10	5	0	0	0	6	10	2
G	36	6	12	30	60			0	36	0	10	C	G	5	10	5	0	0	0	0	0	10	0	0	0	1
R	71	7	15	25	60			0	71	20	8	G	C	10	20	5	0	10	10	5	0	10	20	2	4	1
G	28	13	15	40	110			0	28	10	10	C	G	30	20	20	5	0	10	5	0	0	0	0	3	0
R	120	11	15	20	50			0	120	10	10	C	G	20	20	10	0	20	10	0	0	0	10	4	8	2
G	55	7	30	40	100			0	55	30	6	C	G	20	20	20	5	20	10	0	0	10	40	4	10	4
R	30	7	15	80	30			0	30	0	4	G	C	10	20	10	0	10	5	0	0	0	20	4	10	2

Length (m)	614.0	Fry Rearing Habitat	16%	905 m²	Total Rise (cm)	11.0	AVAILABLE COVER BY TYPE
Mean Wetted Width (m)	9.4	Parr Rearing Habitat	25%	1427 m²	Total Run (m)	614.0	Deep Pool 5.3% 307.0 m²
Mean Channel Width (m)	18.1	Adult Rearing Habitat	17%	984 m²	Gradient (%)	0.0	LWD 13.8% 799.0 m²
Mean Max. Depth (cm)	70.9	Area of pool	4%	225 m²	# pieces LWD / 100 m² (10-20 cm)	1.1	SWD 10.1% 582.4 m²
Surface Area (m²)	5789.0	Area of glide	35%	2027 m²	# pieces LWD / 100 m² (20-50 cm)	1.7	Boulder 0.8% 48.5 m²
Area of Spawning Habitat (m²)	665.8	Area of riffle	61%	3537 m²	# pieces LWD / 100 m² (50+ cm)	0.4	Cut Bank 0.2% 9.8 m²
Spawning Habitat (%)	11.5	Area of cascade	0%	0 m²	Mean D-90 (cm)	8.4	Overhang 4.1% 235.6 m²
Area of habitat > 1 m depth (m²)	307.0	Mean Max. Pool Depth	150.0 cm				Crown Closure 12.1% 702.4 m²

SYSTEM: Table River
SITE: mainstem (38 km)
LOCATION: even with end of cut block above falls

U.T.M.: 10.56818.607388
(NAD 27)

REACH #: 4
DATE: Sept. 27, 1995
WATERSHED CODE: 236 - 4508

WATER TEMPERATURE: 7.5°C
CREW: A.R.L. / T.M.

STREAM PARAMETERS										% SP.	SUBSTRATE			% REARING			% COVER							PIECES OF LWD		
Habitat Type	Length (m)	Wetted Width	Channel Width	Mean Depth	Max. Depth	Riffle Crest	Element	Rise (cm)	Run (m)	HABITAT	D-90 (cm)	Dominant	Subdom	HABITAT Fry	Parr	Adult	Deep Pool	LWD	SWD	Bldr.	Cut Bank	Over Hang	Crown Closure	10-20 (cm)	20-50 (cm)	50+ (cm)
R	32	11	14	20	50			13	32	0	15	C	G	5	20	0	0	0	0	0	0	0	5	5	6	0
G	29	11	17	40	70			0	29	10	15	G	C	5	50	30	0	0	10	0	0	5	10	5	5	0
R	43	21	8	30	60			2	43	0	20	C	G	10	50	10	0	0	0	0	0	10	20	2	9	0
P	23	10	15	70	120	20	LWD	0	23	5	16	C	G	5	70	90	30	20	0	0	0	0	0	10	26	2
R	60	17	35	20	40			19	60	0	12	G	C	5	50	0	0	10	0	0	0	0	0	2	10	1
G	41	18	35	30	100			0	41	10	10	G	C	20	60	20	0	20	10	0	0	0	0	5	12	9
R	16	17	37	15	30			14	16	0	12	C	G	5	20	0	0	0	0	0	0	0	0	2	3	0
G	41	9	18	50	100			0	41	20	8	C	G	20	60	10	0	0	0	0	0	0	5	4	3	0
R	92	11	18	20	50			18	92	5	14	C	G	5	30	5	0	0	0	0	0	5	10	6	5	0
G	21	11	23	30	50			0	21	0	12	C	G	0	20	0	0	0	0	0	0	0	0	4	5	0
R	12	8	23	30	50			2	12	0	14	C	G	0	10	10	0	10	10	0	0	0	10	3	3	0
P	7	16	30	80	120	40	LWD	0	7	10	12	G	C	10	60	70	20	50	10	0	0	0	0	5	11	1
G	12			50	80			0	12	10	10	G	C	10	30	50	0	50	10	0	0	0	0	3	7	2

Length (m)	429.0	Fry Rearing Habitat	9%	483 m²	Total Rise (cm)	68.0	AVAILABLE COVER BY TYPE	
Mean Wetted Width (m)	13.2	Parr Rearing Habitat	44%	2498 m²	Total Run (m)	429.0	Deep Pool	1.6% 91.4 m²
Mean Channel Width (m)	21.3	Adult Rearing Habitat	13%	716 m²	Gradient (%)	0.2	LWD	6.4% 361.2 m²
Mean Max. Depth (cm)	70.8	Area of pool	6%	342 m²	# pieces LWD / 100 m² (10-20 cm)	1.0	SWD	2.2% 126.5 m²
Surface Area (m²)	5654.0	Area of glide	29%	1657 m²	# pieces LWD / 100 m² (20-50 cm)	1.9	Boulder	0.0% 0.0 m²
Area of Spawning Habitat (m²)	252.8	Area of riffle	65%	3655 m²	# pieces LWD / 100 m² (50+ cm)	0.3	Cut Bank	0.0% 0.0 m²
Spawning Habitat (%)	4.5	Area of cascade	0%	0 m²	Mean D-90 (cm)	13.0	Overhang	2.8% 156.9 m²
Area of habitat > 1 m depth (m²)	91.4	Mean Max. Pool Depth	120.0 cm				Crown Closure	6.4% 350.4 m²

SYSTEM: Table River | U.T.M.: 10 57754 607521 | REACH #: 6 | WATER TEMPERATURE: 7°C
SITE: mainstem (50.8 km) | (NAD 27) | DATE: Sept. 29, 1995 | CREW: A.L. / T.M
LOCATION: above falls, mid-site | WATERSHED CODE: 236 - 4508

STREAM PARAMETERS										% SP.	SUBSTRATE			% REARING			% COVER							PIECES OF LWD		
Habitat	Length	Wetted	Channel	Mean	Max	Riffle	Element	Rise	Run	HABITAT	D-90	Dominant	Subdom.	HABITAT			Deep	LWD	SWD	Bldr.	Cut	Over	Crown	10-20	20-50	50+
Type	(m)	Width	Width	Depth	Depth	Crest		(cm)	(m)		(cm)			Fry	Parr	Adult	Pool				Bank	Hang	Closure	(cm)	(cm)	(cm)
R	13	5	15	15	30			20	13	10	9	G	C	10	20	0	0	10	0	0	0	0	10	2	4	1
G	13	4	8	70	40			0	13	10	6	G	F	20	40	20	0	0	10	0	10	10	50	1	1	0
P	12	8	13	40	70	30	LWD	20	12	0	4	F	G	30	70	30	0	0	20	0	0	20	30	3	5	0
G	7	5	15	50	70			0	7	0	4	G	F	10	20	50	0	10	0	0	20	0	10	3	2	0
R	5	5	15	10	15			9	5	0	12	G	C	0	10	0	0	0	0	0	0	0	0	0	0	0
G	15	5	13	20	40			0	15	20	8	G	F	10	30	10	0	10	0	0	0	0	0	2	4	1
R	15	7	11	10	30			8	15	10	8	G	C	20	40	10	0	10	0	0	0	0	0	2	4	1
P	7	7	9	70	90	20	LWD		7	0	12	C	G	20	60	40	0	20	10	0	0	0	30	4	7	0

Length (m)	87.0	Fry Rearing Habitat	17%	88 m²	Total Rise (cm)	57.0	AVAILABLE COVER BY TYPE				
Mean Wetted Width (m)	5.8	Parr Rearing Habitat	41%	204 m²	Total Run (m)	87.0	Deep Pool	0.0%	0.0 m²		
Mean Channel Width (m)	12.2	Adult Rearing Habitat	19%	94 m²	Gradient (%)	0.7	LWD	7.5%	37.8 m²		
Mean Max. Depth (cm)	48.1	Area of pool	29%	145 m²	# pieces LWD / 100 m² (10-20 cm)	3.4	SWD	5.8%	29.3 m²		
Surface Area (m²)	502.0	Area of glide	32%	162 m²	# pieces LWD / 100 m² (20-50 cm)	5.4	Boulder	0.0%	0.0 m²		
Area of Spawning Habitat (m²)	37.2	Area of riffle	39%	195 m²	# pieces LWD / 100 m² (50+ cm)	0.6	Cut Bank	2.4%	12.2 m²		
Spawning Habitat (%)	7.4	Area of cascade	0%	0 m²	Mean D-90 (cm)	7.5	Overhang	4.9%	24.4 m²		
Area of habitat > 1 m depth (m²)	0.0	Mean Max. Pool Depth	80.0 cm				Crown Closure	15.8%	79.5 m²		

Appendix B

SYSTEM: Table River
SITE: unnamed tributary 154
LOCATION: from rail culvert crossing u/s to road culvert

U.T.M.: 10.55004.606485
(NAD 27)

REACH #: 2
DATE: August 30, 1995
WATERSHED CODE: 236 - 4508 - 154

WATER TEMPERATURE: 9.0°C
CREW: J.D. / A.L.

STREAM PARAMETERS										% SP	SUBSTRATE			% REARING			% COVER							PIECES OF LWD		
Habitat Type	Length (m)	Wetted Width	Channel Width	Mean Depth	Max Depth	Riffle Crest	Element	Rise (cm)	Run (m)	HABITAT	D-90 (cm)	Dominant	Subdom.	HABITAT Fry	Parr	Adult	Deep Pool	LWD	SWD	Bldr.	Cut Bank	Over Hang	Crown Closure	10-20 (cm)	20-50 (cm)	50+ (cm)
R	198	3	5	15	40			378	198	10	15	G	C	10	30	0	0	0	0	10	0	20	20	0	0	0
P	5	5	7	50	85	20	BLD	0	5	10	15	C	G	30	50	30	10	0	0	0	0	10	20	0	0	0

Length (m)	203.0	Fry Rearing Habitat	11%	67 m²	Total Rise (cm)	378.0	AVAILABLE COVER BY TYPE				
Mean Wetted Width (m)	3.0	Parr Rearing Habitat	31%	191 m²	Total Run (m)	203.0	Deep Pool	0.4%	2.5 m²		
Mean Channel Width (m)	5.0	Adult Rearing Habitat	1%	8 m²	Gradient (%)	1.9	LWD	0.0%	0 m²		
Mean Max. Depth (cm)	62.5	Area of pool	4%	25 m²	# pieces LWD / 100 m² (10-20 cm)	0.0	SWD	0.0%	0 m²		
Surface Area (m²)	619.0	Area of glide	0%	0 m²	# pieces LWD / 100 m² (20-50 cm)	0.0	Boulder	9.6%	59.4 m²		
Area of Spawning Habitat (m²)	61.9	Area of riffle	96%	594 m²	# pieces LWD / 100 m² (50+ cm)	0.0	Cut Bank	0.0%	0 m²		
Spawning Habitat (%)	10.0	Area of cascade	0%	0 m²	Mean D-90 (cm)	15.0	Overhang	19.6%	121.3 m²		
Area of habitat > 1 m depth (m²)	2.5	Mean Max. Pool Depth	85.0	cm			Crown Closure	20.0%	123.8 m²		

Appendix B

SYSTEM: Table River
SITE: unnamed tributary 154
LOCATION: from road culvert, then u/s 169 m

U.T.M.: 10 355010 606496
(NAD 27)

REACH #: 3
DATE: August 30, 1995
WATERSHED CODE: 236 - 4508 - 154

WATER TEMPERATURE: 9.0°C
CREW: J.D. / A.L.

STREAM PARAMETERS										% SP.	SUBSTRATE			% REARING			% COVER							PIECES OF LWD		
Habitat Type	Length (m)	Wetted Width	Channel Width	Mean Depth	Max. Depth	Riffle Crest	Element	Rise (cm)	Run (m)	HABITAT	D-90 (cm)	Dominant	Subdom.	HABITAT Fry	Parr	Adult	Deep Pool	LWD	SWD	Bldr.	Cut Bank	Over Hang	Crown Closure	10-20 (cm)	20-50 (cm)	50+ (cm)
Cu	15								15															0	0	0
R	10	2	4	15	30			58	10	10	15	G	C	10	20	10	0	0	10	10	0	10	100	0	3	0
G	6	3	4	15	30			3	6	10	12	F	G	30	30	0	0	0	0	0	0	10	90	0	0	0
R	31	3	4	15	25			58	31	5	18	C	G	5	20	0	0	0	0	20	0	0	100	1	0	0
P	2	5	9	30	45	15	LWD	0	2	0	14	G	C	20	40	30	0	40	10	0	0	0	100	1	1	1
P	5	3	7	30	45	5	LWD	60	5	10	12	G	C	20	30	20	0	30	0	0	0	0	100	0	2	0
R	7	3	4	10	20			31	7	20	8	G	C	10	20	0	0	0	0	0	0	0	100	0	0	0
P	2	3	5	45	25	10	LWD	0	2	10	10	G	C	20	50	20	0	40	0	0	0	0	100	0	1	0
R	7	4	5	10	20			20	7	0	10	G	C	20	20	0	0	0	0	10	0	0	100	0	0	0
P	3	5	6	30	55	10	LWD	0	3	10	7	G	F	30	40	40	0	70	0	0	0	0	100	0	1	0
R	6	3	3	15	20			47	6	0	8	G	F	0	10	0	0	0	0	0	0	80	100	0	0	0

Length (m)	79.0	Fry Rearing Habitat	12%	30 m²	Total Rise (cm)	277.0	AVAILABLE COVER BY TYPE		
Mean Wetted Width (m)	3.1	Parr Rearing Habitat	23%	57 m²	Total Run (m)	79.0	Deep Pool	0.0%	0 m²
Mean Channel Width (m)	4.4	Adult Rearing Habitat	6%	15 m²	Gradient (%)	3.5	LWD	8.8%	21.4 m²
Mean Max. Depth (cm)	31.5	Area of pool	19%	46 m²	# pieces LWD / 100 m² (10-20 cm)	0.8	SWD	1.2%	3 m²
Surface Area (m²)	244.0	Area of glide	7%	18 m²	# pieces LWD / 100 m² (20-50 cm)	3.3	Boulder	9.6%	23.4 m²
Area of Spawning Habitat (m²)	16.3	Area of riffle	74%	180 m²	# pieces LWD / 100 m² (50+ cm)	0.4	Cut Bank	0.0%	0 m²
Spawning Habitat (%)	6.7	Area of cascade	0%	0 m²	Mean D-90 (cm)	13.7	Overhang	7.5%	18.2 m²
Area of habitat > 1 m depth (m²)	0.0	Mean Max. Pool Depth	42.5 cm				Crown Closure	99.3%	242.2 m²

SYSTEM: Table River | U.T.M.: 10 55215 606490 | REACH #: - | WATER TEMPERATURE: 7.0°C

SITE: unnamed tributary 199 | (NAD 27) | DATE: August 29, 1995 | CREW: J.D. / J.P. / A.L.

LOCATION: started at road crossing and worked u/s | WATERSHED CODE: 236 - 4508 - 199

STREAM PARAMETERS										% SP.	SUBSTRATE			% REARING			% COVER							PIECES OF LWD		
Habitat	Length	Wetted	Channel	Mean	Max.	Riffle	Element	Rise	Run	HABITAT	D-90	Dominant	Subdom.	HABITAT			Deep	LWD	SWD	Bldr.	Cut	Over	Crown	10-20	20-50	50+
Type	(m)	Width	Width	Depth	Depth	Crest		(cm)	(m)		(cm)			Fry	Parr	Adult	Pool				Bank	Hang	Closure	(cm)	(cm)	(cm)
R	25	4	6	20	55			3	25	20	7	G	F	10	20	0	0	0	0	0	0	0	0	0	1	0
P	11	4	4	70	90	30	LWD	0	11	10	5	G	F	10	30	70	10	20	0	0	10	20	20	2	3	2
G	4	4	6	40	60			1	4	0	5	G	F	10	30	80	0	60	0	0	0	50	60	2	2	3
P	7	5	7	70	100	30	LWD	0	7	10	5	G	F	40	50	80	20	50	10	0	5	10	40	5	2	1
R	112.5	5	6	20	50			181	112.5	10	7	G	F	10	20	0	0	20	10	0	0	70	90	40	34	4

Length (m)	159.5	Fry Rearing Habitat	11%	86 m²	Total Rise (cm)	185.0	AVAILABLE COVER BY TYPE				
Mean Wetted Width (m)	4.7	Parr Rearing Habitat	22%	168 m²	Total Run (m)	159.5	Deep Pool	1.5%	11.4 m²		
Mean Channel Width (m)	5.9	Adult Rearing Habitat	9%	72 m²	Gradient (%)	1.2	LWD	19.6%	148.4 m²		
Mean Max. Depth (cm)	71.0	Area of pool	10%	79 m²	# pieces LWD / 100 m² (10-20 cm)	6.5	SWD	7.9%	59.8 m²		
Surface Area (m²)	757.5	Area of glide	2%	16 m²	# pieces LWD / 100 m² (20-50 cm)	5.5	Boulder	0.0%	0.0 m²		
Area of Spawning Habitat (m²)	84.2	Area of riffle	87%	663 m²	# pieces LWD / 100 m² (50+ cm)	1.3	Cut Bank	0.8%	6.2 m²		
Spawning Habitat (%)	11.1	Area of cascade	0%	0 m²	Mean D-90 (cm)	6.7	Overhang	54.7%	414.1 m²		
Area of habitat > 1 m depth (m²)	11.4	Mean Max. Pool Depth	95.0 cm				Crown Closure	71.1%	538.7 m²		

SYSTEM: Table River
SITE: unnamed tributary 293
LOCATION: approximately 160 m u/s from road crossing

U.T.M.: 10.55455.606802
(NAD 27)

REACH #: 1
DATE: August 25, 1995
WATERSHED CODE: 236 - 4508 - 293

WATER TEMPERATURE: 8.0°C
CREW: J.P. / M.H. / A.L.

STREAM PARAMETERS										% SP.	SUBSTRATE			% REARING			% COVER							PIECES OF LWD		
Habitat Type	Length (m)	Wetted Width	Channel Width	Mean Depth	Max. Depth	Riffle Crest	Element	Rise (cm)	Run (m)	HABITAT	D-90 (cm)	Dominant	Subdom.	HABITAT Fry	Parr	Adult	Deep Pool	LWD	SWD	Bldr.	Cut Bank	Over Hang	Crown Closure	10-20 (cm)	20-50 (cm)	50+ (cm)
R	52	11	15	40	90			59	52	0	25	C	G	0	10	10	0	10	0	5	0	0	20	8	22	1
G	18	10	12	60	80			0	18	10	21	C	G	10	20	10	0	20	0	0	0	5	20	6	8	1
R	75	12	14	50	100			70	75	0	25	C	G	0	10	5	5	5	0	20	0	10	20	6	13	3
P	15	10	15	110	140	30	BLD	0	15	0	25	C	BLD	40	50	90	30	50	10	5	0	0	10	13	15	2

Length (m)	160.0	Fry Rearing Habitat	4%	78 m²	Total Rise (cm)	129.0	AVAILABLE COVER BY TYPE				
Mean Wetted Width (m)	11.3	Parr Rearing Habitat	14%	258 m²	Total Run (m)	160.0	Deep Pool	5.0%	90.0 m²		
Mean Channel Width (m)	14.2	Adult Rearing Habitat	14%	255 m²	Gradient (%)	0.8	LWD	11.8%	213.2 m²		
Mean Max. Depth (cm)	102.5	Area of pool	8%	150 m²	# pieces LWD / 100 m² (10-20 cm)	1.8	SWD	0.8%	15.0 m²		
Surface Area (m²)	1802.0	Area of glide	10%	180 m²	# pieces LWD / 100 m² (20-50 cm)	3.2	Boulder	12.0%	216.1 m²		
Area of Spawning Habitat (m²)	18.0	Area of riffle	82%	1472 m²	# pieces LWD / 100 m² (50 + cm)	0.4	Cut Bank	0.0%	0.0 m²		
Spawning Habitat (%)	1.0	Area of cascade	0%	0 m²	Mean D-90 (cm)	24.6	Overhang	5.5%	99.0 m²		
Area of habitat > 1 m depth (m²)	90.0	Mean Max. Pool Depth	140.0 cm				Crown Closure	19.2%	345.4 m²		

SYSTEM: Table River **U.T.M.:** 10.55468.606768 **REACH #:** 1 **WATER TEMPERATURE:** 10.5°C
SITE: unnamed tributary 293 (NAD 27) **DATE:** July 10, 1995 **CREW:** M.H. / A.L. / R.Z.
LOCATION: from the road crossing bridge to the train crossing bridge **WATERSHED CODE:** 236 - 4508 - 293

STREAM PARAMETERS										% SP.	SUBSTRATE			% REARING			% COVER							PIECES OF LWD		
Habitat	Length	Wetted	Channel	Mean	Max.	Riffle	Element	Rise	Run	HABITAT	D-90	Dominant	Subdom.	HABITAT			Deep	LWD	SWD	Bldr.	Cut	Over	Crown	10-20	20-50	50+
Type	(m)	Width	Width	Depth	Depth	Crest		(cm)	(m)		(cm)			Fry	Parr	Adult	Pool				Bank	Hang	Closure	(cm)	(cm)	(cm)
G	17	13	17	30	60			3	17	5	20	C	G	5	10	10	0	0	0	5	0	0	20	1	0	0
R	98	7	16	30	70			108	98	0	30	C	G	5	10	5	0	0	0	10	0	0	5	3	4	1
P	8	7.5	12	60	100	50	L	0	8	5	20	F	G	40	50	50	50	30	5	0	20	5	50	2	2	1
R	19	8	10	35	40			25	19	0	30	C	BLD	0	0	0	0	0	0	5	0	0	10	1	7	2
G	11	6.5	14.5	35	70			1	11	0	20	C	G	5	10	5	0	5	0	0	0	0	10	0	2	0
R	8	9	14.5	30	50			19	8	0	25	C	G	0	0	0	0	0	0	0	0	5	40	0	0	0
P	11	5	12	80	120	40	L	0	11	5	20	G	C	5	30	80	80	20	5	0	10	20	20	4	6	1
R	25	5	9.5	35	50			27	25	5	30	C	BLD	5	10	5	0	5	0	5	0	20	30	6	6	0
G	32	6	10	40	60			4	32	0	25	C	BLD	10	20	10	0	0	0	0	0	5	10	3	3	2
R	13	8	18	30	50			34	13	0	30	C	BLD	0	0	0	0	10	5	5	0	5	5	6	8	2
P	15	10	15	80	130	40	L	0	15	10	25	C	G	20	30	60	60	30	10	0	0	0	0	7	4	0
R	18	9	16	25	40			16	18	0	20	G	C	5	10	0	0	0	0	10	0	0	0	1	3	0
P	20	8	14	50	130	30	L	0	20	10	15	G	C	20	40	30	20	10	0	0	0	5	5	5	4	1
R	44	9	16	40	60			57	44	0	25	C	G	5	5	0	0	0	0	5	0	10	20	3	4	0
G	23	9	30	30	70			2	23	5	25	C	G	5	10	20	5	0	0	5	0	0	0	9	10	0
R	30	6	30	40	60			36	30	0	20	C	G	0	0	5	0	5	0	0	0	0	0	1	2	0
G	29	6	23	40	60			4	29	5	20	C	G	5	10	5	0	0	0	5	0	0	0	0	0	0
R	19	11	22	20	35			29	19	0	35	C	BLD	5	10	0	0	5	0	30	0	5	5	3	2	0
G	20	6	22	45	80			12	20	5	15	G	C	5	20	10	5	0	0	5	0	5	5	5	3	1
R	11	8	12	25	40			3	11	0	20	C	BLD	0	5	0	0	0	0	10	0	0	0	0	0	1
G	28	11	11	30	70			2	28	10	30	C	G	10	20	5	0	0	0	5	0	5	5	0	0	1
R	90	7	22	30	60			75	90	5	20	C	G	5	10	0	0	5	0	5	0	5	5	17	16	4

Length (m)	589.0	Fry Rearing Habitat	6%	289 m²	Total Rise (cm)	457.0	AVAILABLE COVER BY TYPE
Mean Wetted Width (m)	7.7	Parr Rearing Habitat	12%	552 m²	Total Run (m)	589.0	Deep Pool 4.7% 212.4 m²
Mean Channel Width (m)	14.8	Adult Rearing Habitat	8%	384 m²	Gradient (%)	0.8	LWD 3.6% 161.2 m²
Mean Max. Depth (cm)	68.4	Area of pool	8%	365 m²	# pieces LWD / 100 m² (10-20 cm)	1.7	SWD 0.6% 26.0 m²
Surface Area (m²)	4522.5	Area of glide	20%	1294 m²	# pieces LWD / 100 m² (20-50 cm)	1.0	Boulder 6.2% 278.2 m²
Area of Spawning Habitat (m²)	141.4	Area of riffle	47%	2118 m²	# pieces LWD / 100 m² (50+ cm)	0.4	Cut Bank 0.4% 17.5 m²
Spawning Habitat (%)	3.1	Area of cascade	0%	0 m²	Mean D-90 (cm)	24.3	Overhang 3.7% 168.4 m²
Area of habitat > 1 m depth (m²)	212.4	Mean Max. Pool Depth	126.7 cm				Crown Closure 8.5% 383.1 m²

SYSTEM: Table River
SITE: unnamed tributary 293
LOCATION: at 1,121 m u/s from road crossing

U.T.M.: 10.35420.606870
(NAD 27)

REACH #: 2
DATE: September 5, 1995
WATERSHED CODE: 236 - 4508 - 293

WATER TEMPERATURE: ?°C
CREW: J.F. / S.K.

STREAM PARAMETERS										% SP.	SUBSTRATE			% REARING			% COVER							PIECES OF LWD		
Habitat Type	Length (m)	Wetted Width	Channel Width	Mean Depth	Max. Depth	Riffle Crest	Element	Rise (cm)	Run (m)	HABITAT	D-90 (cm)	Dominant	Subdom.	HABITAT Fry	Parr	Adult	Deep Pool	LWD	SWD	Bldr.	Cut Bank	Over Hang	Crown Closure	10-20 (cm)	20-50 (cm)	50+ (cm)
R	35	10	12	25	40			48	35	0	50	BLD	C	10	10	20	0	0	0	30	0	5	5	5	5	0
G	15	2.5	10	50	90			0	15	10	15	C	F	5	20	10	0	0	0	0	0	0	10	0	3	0

Length (m)	50.0	Fry Rearing Habitat	10%	37 m²	Total Rise (cm)	48.0	AVAILABLE COVER BY TYPE				
Mean Wetted Width (m)	7.8	Parr Rearing Habitat	11%	43 m²	Total Run (m)	50.0	Deep Pool	0.0%	0.0 m²		
Mean Channel Width (m)	11.4	Adult Rearing Habitat	19%	74 m²	Gradient (%)	1.0	LWD	0.0%	0.0 m²		
Mean Max. Depth (cm)	65.0	Area of pool	0%	0 m²	# pieces LWD / 100 m² (10-20 cm)	1.3	SWD	0.0%	0.0 m²		
Surface Area (m²)	387.5	Area of glide	10%	38 m²	# pieces LWD / 100 m² (20-50 cm)	2.1	Boulder	27.1%	105.0 m²		
Area of Spawning Habitat (m²)	3.8	Area of riffle	90%	350 m²	# pieces LWD / 100 m² (50+ cm)	0.0	Cut Bank	0.0%	0.0 m²		
Spawning Habitat (%)	1.0	Area of cascade	0%	0 m²	Mean D-90 (cm)	39.5	Overhang	4.5%	17.5 m²		
Area of habitat > 1 m depth (m²)	0.0	Mean Max. Pool Depth	N/A				Crown Closure	5.5%	21.3 m²		

SYSTEM: Table River
SITE: unnamed tributary 353
LOCATION: from the confluence of the Table River working u/s

U.T.M.: 10.55715.606719 (NAD 27)

REACH #: 1
DATE: September 13, 1995
WATERSHED CODE: 236 - 4508 - 353

WATER TEMPERATURE: 10.0°C
CREW: J.F. / S.K. / A.L.

STREAM PARAMETERS										% SP.	SUBSTRATE			% REARING			% COVER							PIECES OF LWD		
Habitat Type	Length (m)	Wetted Width	Channel Width	Mean Depth	Max. Depth	Riffle Crest	Element	Rise (cm)	Run (m)	HABITAT	D-90 (cm)	Dominant	Subdom.	HABITAT Fry	Parr	Adult	Deep Pool	LWD	SWD	Bldr.	Cut Bank	Over Hang	Crown Closure	10-20 (cm)	20-50 (cm)	50+ (cm)
R	13	3	10	10	20			6	13	30	10	G	C	10	10	0	0	0	0	0	0	10	20	4	4	0
G	12	6	12	40	50			0	12	10	12	F	G	30	30	20	0	10	0	0	0	20	20	3	1	0
R	30	12	15	5	20			36	30	5	12	G	C	40	10	0	0	0	0	0	0	10	20	2	0	0
G	26	8	9	40	70			0	26	0	10	F	G	10	40	30	0	0	0	0	10	0	30	3	2	0
R	15	11	18	5	50			28	15	5	15	G	C	20	30	10	0	10	0	0	0	0	10	11	4	1
P	13	9	12	50	70	10	LWD	0	13	0	10	G	F	10	40	40	0	20	0	0	0	10	40	1	5	0
P	17	5	12	80	110	10	LWD	30	17	0	14	F	C	20	40	80	20	70	20	0	0	0	20	10	16	2
G	22	6	10	40	100			0	22	0	14	F	C	20	30	20	10	0	0	0	0	10	10	3	1	0
R	32	6	13	10	20			24	32	5	15	C	G	10	20	0	0	0	0	0	0	10	20	7	5	0
G	16	7	9	40	80			10	16	0	15	C	G	30	20	20	0	5	0	0	0	0	10	7	3	0
R	16	5	15	20	70			24	16	0	18	C	G	10	10	0	0	10	0	10	0	10	10	4	5	0
G	40	5	11	30	50			0	40	0	22	F	C	30	30	10	0	10	0	0	0	0	0	10	6	3

Length (m)	252.0	Fry Rearing Habitat	23%	399 m²	Total Rise (cm)	158.0	AVAILABLE COVER BY TYPE				
Mean Wetted Width (m)	7.0	Parr Rearing Habitat	25%	443 m²	Total Run (m)	252.0	Deep Pool	1.7%	30.2 m²		
Mean Channel Width (m)	12.1	Adult Rearing Habitat	16%	277 m²	Gradient (%)	0.6	LWD	8.0%	140.2 m²		
Mean Max. Depth (cm)	59.2	Area of pool	11%	202 m²	# pieces LWD / 100 m² (10-20 cm)	3.7	SWD	1.0%	17.0 m²		
Surface Area (m²)	1762.0	Area of glide	41%	724 m²	# pieces LWD / 100 m² (20-50 cm)	3.0	Boulder	0.5%	8.0 m²		
Area of Spawning Habitat (m²)	54.8	Area of riffle	47%	836 m²	# pieces LWD / 100 m² (50+ cm)	0.3	Cut Bank	1.2%	20.8 m²		
Spawning Habitat (%)	3.1	Area of cascade	0%	0 m²	Mean D-90 (cm)	14.6	Overhang	6.0%	106.4 m²		
Area of habitat > 1 m depth (m²)	30.2	Mean Max. Pool Depth	90.0 cm				Crown Closure	17.5%	307.7 m²		

SYSTEM: Table River **U.T.M.:** 10.55893.606785 **REACH #:** 1 **WATER TEMPERATURE:** 9.0°C

SITE: unnamed tributary 404 (NAD 27) **DATE:** **CREW:** M.H. / A.L. / R.Z.

LOCATION: from the confluence with the Table River working u/s **WATERSHED CODE:** 236 - 4508

STREAM PARAMETERS										% SP.	SUBSTRATE			% REARING			% COVER							PIECES OF LWD		
Habitat	Length	Wetted	Channel	Mean	Max.	Riffle	Element	Rise	Run	HABITAT	D-90	Dominant	Subdom.	HABITAT			Deep	LWD	SWD	Bldr.	Cut	Over	Crown	10-20	20-50	50+
Type	(m)	Width	Width	Depth	Depth	Crest		(cm)	(m)		(cm)			Fry	Parr	Adult	Pool				Bank	Hang	Closure	(cm)	(cm)	(cm)
R	60	2.5	14	20	40			284	60	0	40	C	G	0	5	0	0	0	0	10	0	0	0	3	0	0
R	15	5	14	15	40			187	15	0	40	BLD	C	0	0	0	0	0	0	80	0	0	0	0	0	0
R	72	6	7	20	50			359	72	0	35	C	BLD	0	0	0	0	0	0	40	0	20	30	12	7	2
G	12	3	5	20	65			1	12	5	30	F	G	10	20	5	5	0	0	5	5	40	60	1	0	0

Length (m)	159.0	Fry Rearing Habitat	0.5%	4 m²	Total Rise (cm)	831.0	AVAILABLE COVER BY TYPE				
Mean Wetted Width (m)	4.4	Parr Rearing Habitat	2.1%	15 m²	Total Run (m)	159.0	Deep Pool	0.3%	1.8 m²		
Mean Channel Width (m)	10.2	Adult Rearing Habitat	0.3%	2 m²	Gradient (%)	5.2	LWD	0.0%	0.0 m²		
Mean Max. Depth (cm)	48.8	Area of pool	0.0%	0 m²	# pieces LWD / 100 m² (10-20 cm)	2.3	SWD	0.0%	0.0 m²		
Surface Area (m²)	693.0	Area of glide	5.2%	36 m²	# pieces LWD / 100 m² (20-50 cm)	1.0	Boulder	36.0%	249.6 m²		
Area of Spawning Habitat (m²)	1.8	Area of riffle	94.8%	657 m²	# pieces LWD / 100 m² (50+ cm)	0.3	Cut Bank	0.3%	1.8 m²		
Spawning Habitat (%)	0.3	Area of cascade	0.0%	0 m²	Mean D-90 (cm)	37.0	Overhang	14.5%	100.8 m²		
Area of habitat > 1 m depth (m²)	1.8	Mean Max. Pool Depth	N/A				Crown Closure	21.8%	151.2 m²		

SYSTEM: Table River | U.T.M.: 10.55913.606891 | REACH #: 1 | WATER TEMPERATURE: 9.0°C
SITE: unnamed tributary 427 | (NAD 27) | DATE: July 5, 1995 | CREW: M.H. / A.L. / R.Z.
LOCATION: from the confluence with the Table River working u/s | WATERSHED CODE: 236 - 4508 - 427

STREAM PARAMETERS										% SP.	SUBSTRATE			% REARING			% COVER							PIECES OF LWD		
Habitat Type	Length (m)	Wetted Width	Channel Width	Mean Depth	Max. Depth	Riffle Crest	Element	Rise (cm)	Run (m)	HABITAT	D-90 (cm)	Dominant	Subdom.	HABITAT Fry	Parr	Adult	Deep Pool	LWD	SWD	Bldr.	Cut Bank	Over Hang	Crown Closure	10-20 (cm)	20-50 (cm)	50+ (cm)
R	45.5	4.5	7	15	55			51	45.5	20	14	G	C	10	20	5	0	1	0	0	10	40	60	4	4	0
P	5	4	5	30	70	15	LWD	0	5	0	10	C	F	30	40	20	5	30	10	0	0	60	90	6	2	0
R	103	4.5	4.5	20	75			101	103	20	14	C	G	5	10	0	0	5	0	0	5	95	95	11	8	0
P	10	4	5	70	100	25	LWD	1	10	0	10	C	F	30	40	70	50	10	5	0	5	5	10	5	9	0
R	59	4	4.5	15	30			82	59	0	10	C	G	1	1	0	0	5	5	0	0	80	80	12	4	1
P	6	5	5	60	90	20	LWD	1	6	1	8	G	F	5	50	50	40	5	0	0	1	90	100	1	3	0
R	10	4	4	30	40			15	10	0	8	C	F	0	5	0	0	5	0	0	0	70	90	0	2	0
P	6	5.5	6.5	50	70	35	LWD	1	6	5	10	C	G	20	30	80	50	20	0	0	5	80	90	0	1	1
R	39.5	4.5	5	25	45			39	39.5	0	10	C	G	0	0	0	0	1	0	0	0	80	90	0	3	1
P	5.5	6	10	70	100	20	LWD	0	5.5	0	10	C	G	10	20	70	70	10	0	0	0	20	80	4	2	0
R	111	3.5	3	30	60			119	111	5	8	C	G	5	5	5	0	5	0	0	0	50	60	6	7	1
P	4.5	5	7	70	95	30	LWD	0	4.5	0	8	F	C	10	40	90	80	20	5	0	0	1	20	0	3	0

Length (m)	405.0	Fry Rearing Habitat	6%	97 m²	Total Rise (cm)	410.0	AVAILABLE COVER BY TYPE				
Mean Wetted Width (m)	4.2	Parr Rearing Habitat	10%	176 m²	Total Run (m)	405.0	Deep Pool	5.4%	90.6 m²		
Mean Channel Width (m)	5.1	Adult Rearing Habitat	9%	146 m²	Gradient (%)	1.0	LWD	5.1%	86.1 m²		
Mean Max. Depth (cm)	69.2	Area of pool	11%	179 m²	# pieces LWD / 100 m² (10-20 cm)	2.9	SWD	1.0%	16.9 m²		
Surface Area (m²)	1689.0	Area of glide	0%	0 m²	# pieces LWD / 100 m² (20-50 cm)	2.8	Boulder	0.0%	0.0 m²		
Area of Spawning Habitat (m²)	155.0	Area of riffle	89%	1511 m²	# pieces LWD / 100 m² (50+ cm)	0.2	Cut Bank	2.8%	47.6 m²		
Spawning Habitat (%)	9.2	Area of cascade	0%	0 m²	Mean D-90 (cm)	10.8	Overhang	68.1%	1149.7 m²		
Area of habitat > 1 m depth (m²)	90.6	Mean Max. Pool Depth	87.5 cm				Crown Closure	76.6%	1293.7 m²		

SYSTEM: Table River U.T.M.: 10.56154.606942 REACH #: - WATER TEMPERATURE: 8.0°C
SITE: unnamed tributary 431 (NAD 27) DATE: August 24, 1995 CREW: J.D. / I.F. / A.L.
LOCATION: started 250 m d/s from road crossing and ended up 439 m d/s from road crossing WATERSHED CODE: 236 - 4508 - 431

STREAM PARAMETERS										% SP.	SUBSTRATE			% REARING			% COVER							PIECES OF LWD		
Habitat	Length	Wetted	Channel	Mean	Max.	Riffle	Element	Rise	Run	HABITAT	D-90	Dominant	Subdom.	HABITAT			Deep	LWD	SWD	Bldr.	Cut	Over	Crown	10-20	20-50	50+
Type	(m)	Width	Width	Depth	Depth	Crest		(cm)	(m)		(cm)			Fry	Parr	Adult	Pool				Bank	Hang	Closure	(cm)	(cm)	(cm)
R	50	3	6	25	50			39	50	20	6	G	F	5	30	5	0	0	0	0	0	5	5	4	2	0
P	4.5	6	6	60	110	20	SWD	0	4.5	0	2	G	F	10	60	30	10	80	20	0	10	30	30	2	4	2
R	23	2.5	4	25	60			48	23	10	5	F	G	5	10	5	0	10	5	0	0	30	30	2	5	0
G	8	4.5	6	30	40			0	8	30	9	G	F	30	30	20	0	10	0	0	0	50	60	1	2	0
R	6	3.5	6	20	30			9	6	5	4	G	F	0	0	0	0	0	0	0	0	80	90	0	0	0
P	6	3.5	3.5	40	60	30	LWD	0	6	0	1	F	G	20	60	30	0	30	5	0	0	60	90	0	3	2
P	3.5	3.5	3.5	50	60	15	LWD	0	3.5	5	10	G	C	10	30	20	0	20	0	0	0	50	100	0	2	0
R	44	3	3	20	40			63	44	10	12	G	F	5	10	0	0	5	0	0	0	70	90	4	4	2
G	9	4	5	50	60			0	9	0	3	G	F	10	30	10	0	10	5	0	5	10	20	0	5	0
R	5	2.5	4	20	40			2	5	0	3	F	G	0	10	0	0	0	0	0	0	50	80	0	3	0
P	10	5	6	50	70	30	SWD	0	10	0	10	F	G	30	70	20	0	0	5	0	0	90	100	0	2	1
R	10	4	5	30	50			18	10	0	2	G	F	10	20	10	0	5	20	0	0	60	90	0	3	0
G	10	3.5	4	30	50			0	10	5	4	F	G	10	30	10	0	20	10	0	5	40	70	1	2	3

Length (m)	189.0	Fry Rearing Habitat	10%	62 m²	Total Rise (cm)	179.0	AVAILABLE COVER BY TYPE	
Mean Wetted Width (m)	3.3	Parr Rearing Habitat	29%	180 m²	Total Run (m)	189.0	Deep Pool	0.4% 2.7 m²
Mean Channel Width (m)	4.7	Adult Rearing Habitat	9%	56 m²	Gradient (%)	0.9	LWD	9.3% 58.9 m²
Mean Max. Depth (cm)	55.4	Area of pool	17%	110 m²	# pieces LWD / 100 m² (10-20 cm)	2.2	SWD	4.0% 25.1 m²
Surface Area (m²)	630.3	Area of glide	17%	107 m²	# pieces LWD / 100 m² (20-50 cm)	5.9	Boulder	0.0% 0.0 m²
Area of Spawning Habitat (m²)	64.4	Area of riffle	66%	413 m²	# pieces LWD / 100 m² (50+ cm)	1.6	Cut Bank	1.0% 6.3 m²
Spawning Habitat (%)	10.2	Area of cascade	0%	0 m²	Mean D-90 (cm)	6.8	Overhang	43.1% 271.6 m²
Area of habitat > 1 m depth (m²)	2.7	Mean Max. Pool Depth	75.0 cm				Crown Closure	55.7% 351.0 m²

SYSTEM: Table River
SITE: unnamed tributary 496 (Boulder C.)
LOCATION: u/s past fork by ~ 2 km

U.T.M.: 10 55809 606786
(NAD 27)

REACH #: 3
DATE: September 25, 1995
WATERSHED CODE: 236 - 4508 - 496

WATER TEMPERATURE: 7.0°C
CREW: A.L. / T.M

STREAM PARAMETERS									% sp.	SUBSTRATE			% REARING			% COVER							PIECES OF LWD		
Habitat	Length	Wetted	Channel	Mean	Max.	Riffle	Element	Rise	Run	HABITAT	D-90	Dominant	Subdom.	HABITAT			Deep	LWD	SWD	Bldr.	Cut	Over	Crown	10-20	20-50	50+
Type	(m)	Width	Width	Depth	Depth	Crest		(cm)	(m)		(cm)			Fry	Parr	Adult	Pool				Bank	Hang	Closure	(cm)	(cm)	(cm)
G	16	4	11	40	60			0	16	20	16	G	C	20	50	30	0	10	10	0	10	0	20	4	3	0
R	27	4	10	20	50			6	27	10	20	G	C	10	30	10	0	0	0	10	0	0	0	10	4	0
G	24	7	26	40	70			0	24	0	14	G	F	20	70	30	0	10	10	0	0	0	0	4	7	0
R	31	5	26	20	50			21	31	20	18	G	F	20	40	20	0	10	10	0	0	0	10	7	8	1
G	30	7	17	50	100			0	30	20	30	G	C	10	4	20	0	0	0	0	0	0	20	1	4	0

Length (m)	128.0	Fry Rearing Habitat	15%	109 m²	Total Rise (cm)	27.0	AVAILABLE COVER BY TYPE				
Mean Wetted Width (m)	5.5	Parr Rearing Habitat	36%	252 m²	Total Run (m)	128.0	Deep Pool	0.0%	0.0 m²		
Mean Channel Width (m)	18.6	Adult Rearing Habitat	22%	153 m²	Gradient (%)	0.2	LWD	5.5%	38.7 m²		
Mean Max. Depth (cm)	66.0	Area of pool	.0%	0 m²	# pieces LWD / 100 m² (10-20 cm)	3.7	SWD	5.5%	38.7 m²		
Surface Area (m²)	705.0	Area of glide	63%	442 m²	# pieces LWD / 100 m² (20-50 cm)	3.7	Boulder	1.5%	10.8 m²		
Area of Spawning Habitat (m²)	96.6	Area of riffle	37%	263 m²	# pieces LWD / 100 m² (50+ cm)	0.1	Cut Bank	0.9%	6.4 m²		
Spawning Habitat (%)	13.7	Area of cascade	0%	0 m²	Mean d-90 (cm)	20.2	Overhang	0.0%	0.0 m²		
Area of habitat > 1 m depth (m²)	0.0	Mean Max. Pool Depth	N/A				Crown Closure	10.0%	70.3 m²		

SYSTEM: Table River U.T.M.: 10.56232 606969 REACH #: 1 WATER TEMPERATURE: 11.5°C
SITE: unnamed tributary 496 (Boulder C.) (NAD 27) DATE: July 8, 1995 CREW: M.H. / A.L. / R.Z.
LOCATION: from 500 m d/s of road crossing to 216.5 m u/s of road crossing WATERSHED CODE: 236 - 4508 - 496

STREAM PARAMETERS										% SP.	SUBSTRATE			% REARING			% COVER							PIECES OF LWD		
Habitat Type	Length (m)	Wetted Width	Channel Width	Mean Depth	Max Depth	Riffle Crest	Element	Rise (cm)	Run (m)	HABITAT	D-90 (cm)	Dominant	Subdom.	HABITAT Fry	Parr	Adult	Deep Pool	LWD	SWD	Bldr.	Cut Bank	Over Hang	Crown Closure	10-20 (cm)	20-50 (cm)	50+ (cm)
P	46	9	30	110	200	40	cliff bank	0	46	10	15	F	C	50	50	70	50	0	0	0	0	0	0	10	4	1
R	88	13	17.5	30	60			22	88	0	30	C	BLD	5	10	0	0	0	0	5	0	5	5	2	1	0
G	18	9	15	40	80			0	18	0	30	C	BLD	20	40	20	10	0	0	0	5	5	5	1	2	0
R	73	9	15	20	50			1	73	0	30	C	BLD	10	20	0	0	0	0	5	0	0	0	0	0	0
SP	12	4	16	120	150	50	LWD	0	12	0	40	C	BLD	80	90	80	30	30	10	0	0	20	20	2	12	2
R	27	7	16	30	60			43	27	0	30	C	BLD	0	0	0	0	0	0	5	0	0	0	0	6	0
P	14	10	24	90	150	60	log jam	0	14	0	40	C	BLD	10	30	80	70	25	0	0	5	0	0	5	11	3
R	28	8	22	40	100			14	28	5	30	C	BLD	0	5	10	5	5	0	10	0	0	10	0	1	0
G	20	10	16	50	110			0	20	5	50	BLD	C	5	20	50	30	5	0	5	0	0	5	7	5	2
R	145	18	21	40	80			133	145	0	60	BLD	C	5	10	5	0	0	0	5	0	0	0	5	2	2
G	41	16	20	50	70			5	41	0	40	BLD	C	10	20	20	0	0	0	5	0	0	0	0	0	0
R	180	13	15	50	80			253	180	0	80	BLD	C	5	5	10	0	0	0	20	0	0	5	5	6	1
P	14.5	14	14	150	250	50	BLD	4	14.5	0	60	BLD	C	5	10	80	70	0	0	30	0	0	5	0	0	0
R	6	14	18	60	80			7	6	0	70	BLD	C	5	10	20	0	0	0	10	0	0	5	0	0	0
P	16	10	15	200	250	60	BLD	0	16	0	70	BLD	C	5	10	90	90	0	0	20	0	0	5	2	0	0

Appendix B

A25

Length (m)	728.5	Fry Rearing Habitat	8%	760 m²	Total Rise (cm)	482.0	AVAILABLE COVER BY TYPE		
Mean Wetted Width (m)	12.9	Parr Rearing Habitat	13%	1208 m²	Total Run (m)	728.5	Deep Pool	7.5%	692.9 m²
Mean Channel Width (m)	18.6	Adult Rearing Habitat	15%	1414 m²	Gradient (%)	0.7	LWD	0.8%	70.6 m²
Mean Max. Depth (cm)	118.0	Area of pool	10%	965 m²	# pieces LWD / 100 m² (10-20 cm)	0.4	SWD	0.1%	4.8 m²
Surface Area (m²)	9231.0	Area of glide	11%	1018 m²	# pieces LWD / 100 m² (20-50 cm)	0.5	Boulder	9.4%	864.5 m²
Area of Spawning Habitat (m²)	62.6	Area of riffle	79%	7248 m²	# pieces LWD / 100 m² (50+ cm)	0.1	Cut Bank	0.2%	15.1 m²
Spawning Habitat (%)	0.7	Area of cascade	0%	0 m²	Mean D-90 (cm)	51.5	Overhang	0.8%	74.9 m²
Area of habitat > 1 m depth (m²)	692.9	Mean Max. Pool Depth	212.5 cm				Crown Closure	2.7%	246.7 m²

SYSTEM: Table River U.T.M.: 10 56242 607150 REACH #: 1 WATER TEMPERATURE: 7.5°C
SITE: unnamed tributary 527 (NAD 27) DATE: September 29, 1995 CREW: A.L. / T.M.
LOCATION: from the confluence of the Table River working upstream 169 m WATERSHED CODE: 236 - 4508 - 527

STREAM PARAMETERS										% SP.	SUBSTRATE			% REARING			% COVER							PIECES OF LWD		
Habitat	Length	Wetted	Channel	Mean	Max.	Riffle	Element	Rise	Run	HABITAT	D-90	Dominant	Subdom.	HABITAT			Deep	LWD	SWD	Bldr.	Cut	Over	Crown	10-20	20-50	50+
Type	(m)	Width	Width	Depth	Depth	Crest		(cm)	(m)		(cm)			Fry	Parr	Adult	Pool				Bank	Hang	Closure	(cm)	(cm)	(cm)
R	39	8	14	10	15			25	39	0	16	C	G	50	40	0	0	0	0	10	0	20	30	4	1	0
P	16	5	12	30	50	15	LWD	0	16	0	14	C	G	30	30	20	0	20	10	0	0	20	30	2	2	0
G	15	4	15	40	50			0	15	0	14	C	G	20	30	10	0	0	10	0	0	10	20	5	3	1
R	25	4	25	15	40			45	25	0	20	C	G	10	30	10	0	10	0	10	0	10	50	6	11	0
G	19	5	20	20	40			10	19	0	16	C	G	10	30	10	0	10	0	0	0	0	20	2	5	0
R	7	4	9	15	30			8	7	10	10	G	F	0	10	0	0	0	0	0	0	0	0	2	1	0
P	9	9	30	50	60	10	LWD	0	9	0	14	C	G	30	60	40	0	80	10	0	0	0	0	10	13	3
R	27	3		20	50			42	27	0	12	C	G	10	30	10	0	30	20	0	0	20	30	4	5	0
G	12	5	13	30	40			0	12	0	14	C	G	10	40	10	0	20	0	0	0	10	30	9	15	1

Length (m)	169.0	Fry Rearing Habitat	28%	250 m²	Total Rise (cm)	130.0	AVAILABLE COVER BY TYPE		
Mean Wetted Width (m)	5.3	Parr Rearing Habitat	36%	325 m²	Total Run (m)	169.0	Deep Pool	0.0%	0.0 m²
Mean Channel Width (m)	14.5	Adult Rearing Habitat	10%	88 m²	Gradient (%)	0.8	LWD	15.2%	136.6 m²
Mean Max. Depth (cm)	41.7	Area of pool	18%	161 m²	# pieces LWD / 100 m² (10-20 cm)	4.9	SWD	4.3%	38.3 m²
Surface Area (m²)	897.0	Area of glide	24%	215 m²	# pieces LWD / 100 m² (20-50 cm)	6.2	Boulder	4.6%	41.2 m²
Area of Spawning Habitat (m²)	2.8	Area of riffle	58%	521 m²	# pieces LWD / 100 m² (50+ cm)	0.6	Cut Bank	0.0%	0.0 m²
Spawning Habitat (%)	0.3	Area of cascade	0%	0 m²	Mean D-90 (cm)	15.1	Overhang	13.0%	116.6 m²
Area of habitat > 1 m depth (m²)	0.0	Mean Max. Pool Depth	55.0 cm				Crown Closure	26.9%	240.9 m²

SYSTEM: Table River U.T.M.: 10.56475.607416 REACH #: 1 WATER TEMPERATURE: 7°C
SITE: unnamed tributary 605 (NAD 27) DATE: August 23, 1995 CREW: B.B. / M.H.
LOCATION: from the mouth to 376 m upstream of tributary 605 WATERSHED CODE: 236 - 4508

STREAM PARAMETERS										% SP	SUBSTRATE			% REARING			% COVER							PIECES OF LWD		
Habitat	Length	Wetted	Channel	Mean	Max.	Riffle	Element	Rise	Run	HABITAT	D-90	Dominant	Subdom.	HABITAT			Deep	LWD	SWD	Bldr.	Cut	Over	Crown	10-20	20-50	50+
Type	(m)	Width	Width	Depth	Depth	Crest		(cm)	(m)		(cm)			Fry	Parr	Adult	Pool				Bank	Hang	Closure	(cm)	(cm)	(cm)
P	13	R	14	60	100	50	SP	0	13	5	25	C	G	20	50	30	10	20	10	0	5	20	30	1	2	1
R	32	10	24	35	70			30	32	0	40	B	C	10	20	5	0	5	5	10	0	0	10	12	5	2
P	23	10	14	70	170	15	LJ	14	23	5	30	C	S	20	70	50	60	40	10	0	0	0	0	20	12	5
R	76	9	26	30	55			36	76	0	40	B	C	15	40	5	0	5	0	30	15	10	20	8	5	0
P	21	8	11	100	180	40		2	21	0	40	C	G	5	70	70	80	20	10	0	0	0	10	3	1	2
G	14	9	12	30	50			12	14	0	50	C	B	10	25	5	0	0	0	20	10	10	25	0	0	0
R	42	12	16	30	50			17	42	0	25	C	B	5	25	0	0	0	10	10	0	5	10	9	5	1
G	64	12	12	40	60			22	64	0	30	C	G	10	10	5	0	0	0	0	0	5	5	2	4	0
SP	18	5	20	70	115			2	18	0	15	C	G	5	10	70	80	5	0	0	0	5	5	0	2	1
R	35	10	20	25	50	50		25	35	5	40	C	G	10	20	0	0	0	0	15	0	5	5	3	2	1
P	16	9	25	60	105	50		0	16	5	25	C	G	5	70	50	40	15	5	0	0	5	0	1	4	2
P	15	7	32	70	150	50	L	11	15	0	20	G	C	5	60	50	40	5	25	0	5	5	0	7	6	1
G	25	9	18	30	45			11	25	20	25	C	G	5	20	0	0	0	0	0	0	5	5	3	3	1

Length (m)	394.0	Fry Rearing Habitat	10%	412 m²	Total Rise (cm)	202.0	AVAILABLE COVER BY TYPE				
Mean Wetted Width (m)	10.8	Parr Rearing Habitat	31%	1239 m²	Total Run (m)	394.0	Deep Pool	11.2%	454.4 m²		
Mean Channel Width (m)	19.9	Adult Rearing Habitat	13%	546 m²	Gradient (%)	0.5	LWD	5.6%	228.0 m²		
Mean Max. Depth (cm)	92.3	Area of pool	21%	841 m²	# pieces LWD / 100 m² (10-20 cm)	1.7	SWD	3.7%	150.1 m²		
Surface Area (m²)	4063.0	Area of glide	28%	1119 m²	# pieces LWD / 100 m² (20-50 cm)	1.3	Boulder	9.9%	402.1 m²		
Area of Spawning Habitat (m²)	137.1	Area of riffle	52%	2103 m²	# pieces LWD / 100 m² (50+ cm)	0.4	Cut Bank	3.1%	125.7 m²		
Spawning Habitat (%)	3.4	Area of cascade	0%	0 m²	Mean D-90 (cm)	34.1	Overhang	5.5%	223.4 m²		
Area of habitat > 1 m depth (m²)	454.4	Mean Max. Pool Depth	141.0	cm			Crown Closure	9.4%	382.6 m²		

SYSTEM: Table River
SITE: unnamed tributary 610
LOCATION: from the first bridge crossing working upstream

U.T.M.: 10.56555.607481 (NAD 27)

REACH #: 1
DATE: July 20, 1995
WATERSHED CODE: 236 - 4508 - 610

WATER TEMPERATURE: 10.5°C
CREW: A.L. / R.Z.

STREAM PARAMETERS										% SP.	SUBSTRATE			% REARING			% COVER							PIECES OF LWD		
Habitat	Length	Wetted	Channel	Mean	Max.	Riffle	Element	Rise	Run	HABITAT	D-90	Dominant	Subdom.	HABITAT			Deep	LWD	SWD	Bldr.	Cut	Over	Crown	10-20	20-50	50+
Type	(m)	Width	Width	Depth	Depth	Crest		(cm)	(m)		(cm)			Fry	Parr	Adult	Pool				Bank	Hang	Closure	(cm)	(cm)	(cm)
P	18	17	18	65	120	30	BLD	0	18	0	12	G	S	5	50	25	20	0	0	0	0	0	0	1	0	0
R	26	17	18	35	55			0	26	10	20	G	C	10	30	10	0	0	0	10	0	5	5	1	2	0
G	31	14	19	50	110			1	31	10	25	G	C	5	20	30	20	0	0	0	0	0	5	2	2	0
R	94	10	19	35	75			13	94	0	40	C	G	0	10	10	0	0	5	5	0	5	5	3	5	0
G	24	13	22	40	50			0	24	0	30	C	G	5	10	10	0	0	0	5	0	5	5	1	1	1
R	43	13	14	35	50			20	43	0	35	C	B	5	10	10	0	0	0	20	0	10	10	3	5	0
G	21	13	19	35	45			0	21	10	20	G	C	5	10	0	0	0	0	0	0	0	0	1	2	0
P	14	11	19	70	110	50	BLD	0	14	10	20	G	C	10	30	50	50	0	0	0	0	0	0	0	0	0
G	20	20	23	20	110			0	20	60	3	G	S	10	30	20	10	0	0	0	0	0	0	2	2	0
R	67	10	14	35	60			23	67	0	35	C	B	10	20	0	0	5	0	10	0	5	5	0	2	0
G	35	11	15	40	90			0	35	20	30	G	C	10	20	20	10	0	0	5	0	0	5	0	1	0
P	14	14	16	80	120	45	BLD	0	14	0	30	C	B	10	10	60	50	0	0	5	0	0	0	1	0	0
R	41	9	18	30	40			34	41	0	20	C	B	0	10	10	0	0	0	20	0	0	5	0	9	0
G	61	13	16	60	120			0	61	0	15	G	S	30	50	60	40	20	0	0	0	5	10	1	4	1
R	31	10	16	30	60			4	31	10	10	G	C	0	10	5	0	10	0	0	0	0	5	3	3	1

Length (m)	540.0	Fry Rearing Habitat	9%	557 m²	Total Rise (cm)	95.0	AVAILABLE COVER BY TYPE		
Mean Wetted Width (m)	12.1	Parr Rearing Habitat	22%	1442 m²	Total Run (m)	540.0	Deep Pool	11.0%	718.7 m²
Mean Channel Width (m)	17.3	Adult Rearing Habitat	20%	1312 m²	Gradient (%)	0.2	LWD	3.4%	223.1 m²
Mean Max. Depth (cm)	81.0	Area of pool	10%	656 m²	# pieces LWD / 100 m² (10-20 cm)	0.3	SWD	0.7%	47.0 m²
Surface Area (m²)	6543.0	Area of glide	40%	2597 m²	# pieces LWD / 100 m² (20-50 cm)	0.6	Boulder	5.9%	388.5 m²
Area of Spawning Habitat (m²)	478.3	Area of riffle	50%	3290 m²	# pieces LWD / 100 m² (50+ cm)	0.0	Cut Bank	0.0%	0.0 m²
Spawning Habitat (%)	7.3	Area of cascade	0%	0 m²	Mean D-90 (cm)	26.1	Overhang	3.3%	213.8 m²
Area of habitat > 1 m depth (m²)	718.7	Mean Max. Pool Depth	116.7 cm				Crown Closure	5.0%	328.3 m²

SYSTEM: Table River **U.T.M.:** 10.56564.607380 **REACH #:** 1 **WATER TEMPERATURE:** 8.0°C

SITE: unnamed tributary 626 (NAD 27) **DATE:** July 11, 1995 **CREW:** M.H. / A.L. / R.Z.

LOCATION: from confluence of Table River working upstream **WATERSHED CODE:** 236 - 4508 - 626

STREAM PARAMETERS										% SP.	SUBSTRATE			% REARING			% COVER							PIECES OF LWD		
Habitat	Length	Wetted	Channel	Mean	Max.	Riffle	Element	Rise	Run	HABITAT	D-90	Dominant	Subdom.	HABITAT			Deep	LWD	SWD	Bldr.	Cut	Over	Crown	10-20	20-50	50+
Type	(m)	Width	Width	Depth	Depth	Crest		(cm)	(m)		(cm)			Fry	Parr	Adult	Pool				Bank	Hang	Closure	(cm)	(cm)	(cm)
R	16.5	5	12	15	30			26	16.5	5	9	G	S	5	10	0	0	0	0	0	0	20	20	0	1	10
P	13	3	7	50	90	15	L	1	13	10	7	S	G	30	60	40	30	40	10	0	0	70	100	8	5	0
R	19	7	8	20	40			6	19	30	9	G	S	5	10	5	0	0	5	0	0	70	95	11	2	0
G	8	7	9	25	50			0	8	5	9	G	S	5	30	10	0	0	30	0	20	90	100	12	0	0
R	80	7	7	25	50			79	80	10	12	G	S	5	10	0	0	0	0	0	0	80	100	43	5	0
P	5	8	8	70	110	20	L	0	5	5	7	S	G	10	20	90	80	60	0	0	0	95	100	7	3	0
G	7	7	9	20	65			0	7	5	10	G	S	5	10	5	0	10	0	0	0	80	100	0	2	0
P	5	12	20	50	80	30	L	0	5	10	8	G	S	20	30	40	20	60	20	0	0	30	100	5	5	0
R	53.5	7	9	25	60			136	53.5	10	12	G	C	5	10	5	0	5	5	0	0	60	95	56	7	4
P	7	7.5	7.5	40	60	15	L	0	7	0	9	C	S	20	30	20	5	30	10	0	0	70	90	3	1	0
R	6	7	9	20	30			14	6	0	14	C	G	5	10	0	0	5	5	0	0	90	100	3	1	0
G	9	7	12	25	50			12	9	0	12	G	C	5	20	10	5	0	20	0	5	60	100	5	0	0

Length (m)	229.0	Fry Rearing Habitat	7%	106 m²	Total Rise (cm)	274.0	AVAILABLE COVER BY TYPE	
Mean Wetted Width (m)	6.8	Parr Rearing Habitat	14%	219 m²	Total Run (m)	229.0	Deep Pool	4.0% 61.5 m²
Mean Channel Width (m)	8.6	Adult Rearing Habitat	8%	126 m²	Gradient (%)	1.2	LWD	7.5% 117.1 m²
Mean Max. Depth (cm)	59.6	Area of pool	12%	192 m²	# pieces LWD / 100 m² (10-20 cm)	9.9	SWD	5.0% 78.0 m²
Surface Area (m²)	1551.5	Area of glide	11%	168 m²	# pieces LWD / 100 m² (20-50 cm)	2.1	Boulder	0.0% 0.0 m²
Area of Spawning Habitat (m²)	154.6	Area of riffle	77%	1192 m²	# pieces LWD / 100 m² (50+ cm)	0.9	Cut Bank	0.9% 14.4 m²
Spawning Habitat (%)	10.0	Area of cascade	0%	0 m²	Mean D-90 (cm)	10.8	Overhang	68.8% 1067.6 m²
Area of habitat > 1 m depth (m²)	61.5	Mean Max. Pool Depth	85.0 cm				Crown Closure	93.8% 1454.9 m²

Appendix B

SYSTEM: Table River
SITE: unnamed tributary 626
LOCATION: 31m d/s of road culvert to u/s end of train culvert

U.T.M.: 10.56671.607261 (NAD 27)

REACH #: 2
DATE: July 12, 1995
WATERSHED CODE: 236 - 4508 - 626

WATER TEMPERATURE: 7.0°C
CREW: M.H. / A.L. / R.Z.

STREAM PARAMETERS										% SP.	SUBSTRATE			% REARING HABITAT			% COVER						PIECES OF LWD		
Habitat Type	Length (m)	Wetted Width	Channel Width	Mean Depth	Max. Depth	Riffle Crest	Element	Rise (cm)	Run (m)	HABITAT	D-90 (cm)	Dominant	Subdom.	Fry	Parr	Adult	Deep Pool	LWD	SWD	Bldr.	Cut Bank	Over Hang	Crown Closure	10-20 (cm)	20-50 (cm)	50+ (cm)
R	25	7	8	25	60			235	25	0	60	BLD	C	0	0	0	0	0	0	90	0	10	20	3	1	1
P	6	6	6.5	100	170	40	BLD	0	6	0	60	BLD	C	5	5	10	90	0	0	10	0	20	40	0	0	0
CU	21	1.5	2.3		40			24	21	0														0	0	0
R	104	6	12	30	70			561	104	0	60	BLD	C	0	5	5	0	0	0	80	0	10	35			
CA	10							185	9.5			BLD	C											3	10	4
CU	66								66																	

Length (m)	166.0	Fry Rearing Habitat	0%	2 m²	Total Rise (cm)	1005.0	AVAILABLE COVER BY TYPE				
Mean Wetted Width (m)	5.2	Parr Rearing Habitat	4%	33 m²	Total Run (m)	165.5	Deep Pool	3.7%	32.4 m²		
Mean Channel Width (m)	9.2	Adult Rearing Habitat	4%	35 m²	Gradient (%)	6.1	LWD	0.0%	0.0 m²		
Mean Max. Depth (cm)	85.0	Area of pool	4%	36 m²	# pieces LWD / 100 m² (10-20 cm)	0.7	SWD	0.0%	0.0 m²		
Surface Area (m²)	866.5	Area of glide	0%	0 m²	# pieces LWD / 100 m² (20-50 cm)	1.3	Boulder	76.2%	660.3 m²		
Area of Spawning Habitat (m²)	0.0	Area of riffle	92%	799 m²	# pieces LWD / 100 m² (50+ cm)	0.6	Cut Bank	0.0%	0.0 m²		
Spawning Habitat (%)	0.0	Area of cascade	0%	0 m²	Mean D-90 (cm)	60.0	Overhang	10.1%	87.1 m²		
Area of habitat > 1 m depth (m²)	32.4	Mean Max. Pool Depth	170.0 cm				Crown Closure	30.9%	267.8 m²		

APPENDIX C

Arctic Grayling Habitat Utilization Data

Table C1. Summary of 1995 Arctic grayling habitat utilization data collected in the Table River mainstem. Taken from Langston (in prep.).

LOCATION (km point)	HABITAT TYPE	DEPTH (cm)	VELOCITY (m/s)			SUBSTRATE		COMMENTS
			10 cm	60%	Surface	Dominant	Subdominant	
9.1	glide	155	0.42	0.46	0.58	sand	gravel	LWD 7m from left bank
9.1	glide	138	0.54	0.5	0.63	gravel	sand	LWD 5 m from left bank
9	pool	150	0.4	0.54	0.62	gravel	cobble	debris jam
9	pool	180	0.23	0.05	0.21	gravel	cobble	debris jam
8.4	pool	150	0.33	0.55	0.36	sand	gravel	
8	run	115	0.52	1	1.08	gravel	sand	
8	pool	170	0.33	0.1	1.28	sand	sand	
8	pool	205	0.15	0.32	0.19	gravel	sand	
7.9	glide	70	0.28	0.63	0.6	cobble	gravel	
7.7	glide	110	0.54	1.05	0.82	gravel	cobble	
7.6	glide	118	0.72	1.18	0.86	cobble	gravel	LWD 1 m fromright bank
7.5	glide	165	0.26	0.69	0.62	gravel	cobble	LWD 1 m from right bank
7.5	glide	125	0	1.16	0.37	cobble	gravel	LWD at fish location
7.9	glide	73	0.47	0.82	0.72	gravel	sand	one of 2 grayling found (length=12 cm)
7.9	glide	73	0.47	0.82	0.72	gravel	sand	one of 2 grayling found (length=12 cm)
7.7	glide	108	0.63	1.18	1.02	gravel	sand	one of 8 grayling found (length=12 cm)
7.7	glide	108	0.63	1.18	1.02	gravel	sand	one of 8 grayling found (length=12 cm)
7.7	glide	108	0.63	1.18	1.02	gravel	sand	one of 8 grayling found (length=12 cm)
7.7	glide	108	0.63	1.18	1.02	gravel	sand	one of 8 grayling found (length=12 cm)
7.7	glide	108	0.63	1.18	1.02	gravel	sand	one of 8 grayling found (length=12 cm)
7.7	glide	108	0.63	1.18	1.02	gravel	sand	one of 8 grayling found (length=12 cm)
7.7	glide	108	0.63	1.18	1.02	gravel	sand	one of 8 grayling found (length=12 cm)
7.5	pool	110	0.11	0.01	0	cobble	gravel	grayling length=23 cm
6.8	glide	120	0.37	0.75	0.65	cobble	gravel	grayling length=17 cm
5.9	glide	140	0.27	0.68	0.47	gravel	cobble	grayling length=26 cm
5.7	glide	90	0.69	0.86	0.79	gravel	cobble	grayling length=12 cm
5.4	glide	46	0.62	0.82	0.61	gravel	sand	grayling length=10 cm
35.5	pool	135	0.4	0.55	0.35			
35.4	pool	130	0.25	0.45	0.51			one of 4 grayling found
35.4	pool	130	0.25	0.45	0.51			one of 4 grayling found
35.4	pool	130	0.25	0.45	0.51			one of 4 grayling found
35.4	pool	130	0.25	0.45	0.51			one of 4 grayling found
35.15	pool	120	0.31	0.42	0.27			one of 6 grayling found
35.15	pool	120	0.31	0.42	0.27			one of 6 grayling found
35.15	pool	120	0.31	0.42	0.27			one of 6 grayling found
35.15	pool	120	0.31	0.42	0.27			one of 6 grayling found
35.15	pool	120	0.31	0.42	0.27			one of 6 grayling found
35.15	pool	120	0.31	0.42	0.27			one of 6 grayling found
35.1	pool	125	0.3	0.73	0.76			one of 5 grayling found
35.1	pool	125	0.3	0.73	0.76			one of 5 grayling found
35.1	pool	125	0.3	0.73	0.76			one of 5 grayling found
35.1	pool	125	0.3	0.73	0.76			one of 5 grayling found
35.1	pool	125	0.3	0.73	0.76			one of 5 grayling found
34.5	pool	125	0.05	0.05	0.06			
34.3	pool	150	0.11	0.4	0.3			one of 6 grayling found
34.3	pool	150	0.11	0.4	0.3			one of 6 grayling found
34.3	pool	150	0.11	0.4	0.3			one of 6 grayling found
34.3	pool	150	0.11	0.4	0.3			one of 6 grayling found
34.3	pool	150	0.11	0.4	0.3			one of 6 grayling found
34.3	pool	150	0.11	0.4	0.3			one of 6 grayling found
34.3	pool	260	0.28	0.2	0.2			one of 4 grayling found
34.3	pool	260	0.28	0.2	0.2			one of 4 grayling found
34.3	pool	260	0.28	0.2	0.2			one of 4 grayling found
34.3	pool	260	0.28	0.2	0.2			one of 4 grayling found
34.3	pool	150	0.45	0.64	0.45			one of 4 grayling found
34.3	pool	150	0.45	0.64	0.45			one of 4 grayling found
34.3	pool	150	0.45	0.64	0.45			one of 4 grayling found
34.3	pool	150	0.45	0.64	0.45			one of 4 grayling found
	Means =	136.1	0.4	0.6	0.6			

Table C2. Summary of 1996 Arctic grayling habitat utilization in the Table River mainstem.

GRAYLING LOCATION (km point)	HABITAT TYPE	FISH DEPTH (m)	VELOCITY (m/s)			SUBSTRATE		PRIMARY COVER	COMMENTS
			Fish Location	Max.	Surface	Dominant	Subdominant		
6.3	glide	1.1	0.60	0.52	0.75	gravel	sand	LWD	one grayling found
6.4	glide	1.0	0.35	0.65	0.74	cobble	gravel	none	one grayling found
6.8	glide	1.2	0.28	0.96	0.32	cobble	gravel	LWD	one grayling found
6.8	glide	1.2	0.28	0.96	0.32	cobble	gravel	LWD	one grayling found
21.9	glide/pool	1.7	0.40	1.19	0.73	gravel	cobble	depth	one grayling found
21.9	run/pool	1.5	0.39	1.48	1.48	cobble	gravel	surface turb.	one grayling found
22.0	glide/run	1.1	0.56	1.16	1.00	sand	gravel	depth	one grayling found
22.1	glide/pool	1.4	0.14	0.85	0.84	gravel	sand	LWD	one grayling found
22.1	run/glide	1.1	0.44	1.35	0.89	gravel	sand	depth	one of 2 grayling found
22.1	run/glide	1.1	0.44	1.35	0.89	gravel	sand	depth	one of 2 grayling found
22.3	run	1.0	0.90	1.36	0.91	gravel	sand	depth	one of 3 grayling found
22.3	run	1.0	0.90	1.36	0.91	gravel	sand	depth	one of 3 grayling found
22.3	run	1.0	0.90	1.36	0.91	gravel	sand	depth	one of 3 grayling found
22.5	pool/debris jam	1.9	0.34	0.61	0.42	gravel	sand	LWD	one of 2 grayling found
22.5	pool/debris jam	1.9	0.34	0.61	0.42	gravel	sand	LWD	one of 2 grayling found
22.7	glide/pool	1.8	0.36	0.71	0.63	cobble	gravel	LWD	one of 2 grayling found
22.7	glide/pool	1.8	0.36	0.71	0.63	cobble	gravel	LWD	one of 2 grayling found
22.7	glide	1.3	0.41	1.03	0.98	gravel	cobble	depth	one grayling found
22.8	glide/pool	1.8	0.43	0.59	0.43	gravel	sand	depth	one grayling found
24.9	glide	1.4	0.38	0.68	0.60	gravel	sand	depth	one grayling found
25.0	glide	1.5	0.24	0.43	0.39	gravel	sand	depth	one of 2 grayling found
25.0	glide	1.5	0.24	0.43	0.39	gravel	sand	depth	one of 2 grayling found
25.1	glide	1.2	0.23	0.57	0.47	gravel	sand	depth	one of 2 grayling found
25.1	glide	1.2	0.23	0.57	0.47	gravel	sand	depth	one of 2 grayling found
25.1	glide	1.6	0.58	0.57	0.36	cobble	gravel	LWD	one grayling found
25.1	glide	1.1	0.60	1.07	0.87	cobble	gravel	surface turb.	one of 3 grayling found
25.1	glide	1.1	0.60	1.07	0.87	cobble	gravel	surface turb.	one of 3 grayling found
25.1	glide	1.1	0.60	1.07	0.87	cobble	gravel	surface turb.	one of 3 grayling found
25.1	glide	1.0	0.73	1.23	0.93	gravel	cobble	surface turb.	one of 2 grayling found
25.1	glide	1.0	0.73	1.23	0.93	gravel	cobble	surface turb.	one of 2 grayling found
25.2	run	1.1	0.50	1.57	0.95	gravel	cobble	depth	one grayling found
25.3	glide	1.4	0.14	0.54	0.39	sand	gravel	depth	one grayling found
25.4	glide	1.3	0.52	0.52	0.51	gravel	cobble	depth	one grayling found
25.4	glide	1.3	0.36	0.63	0.63	cobble	gravel	depth	one grayling found
25.4	glide	1.3	0.25	0.58	0.46	cobble	gravel	depth	one of 2 grayling found
25.4	glide	1.3	0.25	0.58	0.46	cobble	gravel	depth	one of 2 grayling found
25.5	glide	1.3	0.25	1.28	1.25	cobble	gravel	depth	one grayling found
25.5	glide	0.9	0.38	0.88	0.87	cobble	gravel	none	one grayling found
25.6	pool	1.0	0.20	0.36	0.20	gravel	sand	LWD	one grayling found
25.6	pool	1.0	0.40	0.31	0.29	gravel	cobble	LWD	one grayling found
25.6	pool	1.3	0.34	0.70	0.33	gravel	cobble	depth	one grayling found
25.6	run/glide	1.1	0.71	1.16	0.86	gravel	cobble	surface turb.	one of 3 grayling found
25.6	run/glide	1.1	0.71	1.16	0.86	gravel	cobble	surface turb.	one of 3 grayling found
25.6	run/glide	1.1	0.71	1.16	0.86	gravel	cobble	surface turb.	one of 3 grayling found
25.6	run/glide	1.0	0.46	1.34	1.32	gravel	sand	surface turb.	one of 2 grayling found
25.6	run/glide	1.0	0.46	1.34	1.32	gravel	sand	surface turb.	one of 2 grayling found
25.6	run/glide	0.9	0.57	1.39	1.39	gravel	sand	surface turb.	one grayling found
25.7	run	1.0	0.59	1.19	1.14	gravel	cobble	depth	one grayling found

Table C2 (continued). Summary of 1996 Arctic grayling habitat utilization in the Table River mainstem.

GRAYLING LOCATION (km point)	HABITAT TYPE	FISH DEPTH (m)	VELOCITY (m/s)			SUBSTRATE		PRIMARY COVER	COMMENTS
			Fish Location	Max.	Surface	Dominant	Subdominant		
33.6	glide	1.1	0.35	0.83	0.83	gravel	cobble	depth	one grayling found
33.7	run	0.9	0.32	1.41	0.88	cobble	gravel	surface turb.	one grayling found
33.9	glide	1.3	0.51	0.86	0.65	cobble	gravel	depth	one of 5 grayling found
33.9	glide	1.3	0.51	0.86	0.65	cobble	gravel	depth	one of 5 grayling found
33.9	glide	1.3	0.51	0.86	0.65	cobble	gravel	depth	one of 5 grayling found
33.9	glide	1.3	0.51	0.86	0.65	cobble	gravel	depth	one of 5 grayling found
33.9	glide	1.3	0.51	0.86	0.65	cobble	gravel	depth	one of 5 grayling found
33.9	glide	1.3	0.29	0.84	0.24	gravel	cobble	depth	one of 2 grayling found
33.9	glide	1.3	0.29	0.84	0.24	gravel	cobble	depth	one of 2 grayling found
33.9	glide	1.3	0.58	0.91	0.55	cobble	sand	depth	one grayling found
33.9	glide	0.9	0.73	1.26	1.21	cobble	gravel	LWD	one grayling found
34.3	glide	1.1	0.32	0.68	0.28	cobble	gravel	LWD	one grayling found
34.4	pool	1.6	0.39	1.50	0.61	cobble	gravel	depth	one of 4 grayling found
34.4	pool	1.6	0.39	1.50	0.61	cobble	gravel	depth	one of 4 grayling found
34.4	pool	1.6	0.39	1.50	0.61	cobble	gravel	depth	one of 4 grayling found
34.4	pool	1.6	0.39	1.50	0.61	cobble	gravel	depth	one of 4 grayling found
34.4	pool	1.8	0.47	0.49	0.41	cobble	gravel	depth	one of 8 grayling found
34.4	pool	1.8	0.47	0.49	0.41	cobble	gravel	depth	one of 8 grayling found
34.4	pool	1.8	0.47	0.49	0.41	cobble	gravel	depth	one of 8 grayling found
34.4	pool	1.8	0.47	0.49	0.41	cobble	gravel	depth	one of 8 grayling found
34.4	pool	1.8	0.47	0.49	0.41	cobble	gravel	depth	one of 8 grayling found
34.4	pool	1.8	0.47	0.49	0.41	cobble	gravel	depth	one of 8 grayling found
34.4	pool	1.8	0.47	0.49	0.41	cobble	gravel	depth	one of 8 grayling found
34.5	pool	1.2	0.52	1.42	0.29	sand	gravel	surface turb.	one of 4 grayling found
34.5	pool	1.2	0.52	1.42	0.29	sand	gravel	surface turb.	one of 4 grayling found
34.5	pool	1.2	0.52	1.42	0.29	sand	gravel	surface turb.	one of 4 grayling found
34.5	pool	1.2	0.52	1.42	0.29	sand	gravel	surface turb.	one of 4 grayling found
34.6	pool	1.4	0.39	0.89	0.66	gravel	cobble	LWD	one grayling found
34.9	pool	1.1	0.47	0.69	0.69	gravel	cobble	depth	one of 2 grayling found
34.9	pool	1.1	0.47	0.69	0.69	gravel	cobble	depth	one of 2 grayling found
34.9	pool	1.2	0.43	1.05	1.05	cobble	sand	depth	one grayling found
34.9	pool	1.2	0.66	1.40	1.40	cobble	sand	depth	one grayling found
	Means =	**1.3**	**0.5**	**0.9**	**0.7**				

NOTE: PRIMARY COVER Abbreviations:
1) LWD = large woody debris
2) surface turb. = surface turbulence

Table C3. Detailed Arctic grayling habitat utilization data collected on the Table River mainstem in 1996.

SYSTEM: Table River
LOCATION: Mainstem (35 km to 34 km plus 400 m downstream)
DATE: August 13, 1996

U.T.M.: 10.565351.6074207
MAP SHEET: 93 I/13
CREW: A.L./ R.Z./ S.K./ B.F./ J.F./ D.L.

WATER TEMPERATURE: 12.0 °C
REACH #: 3
WATERSHED CODE: 236 - 4508

Site	Location (km)	Width (m)				Habitat		X-section	Fish depth (m)	Cover	Substrate f/g/c/b (%)	LWD	Distance from LWD (m)	Grayling		Other fish presence			Velocity (m/s)			
		Channel	Wetted	Fish	Thalweg	Type	Max. depth (m)	Max. depth (m)		Type				F.L. (mm)	No	sp / gen	F.L. (mm)	No.	Fish	Surface	Bottom	Max
1	34.91	21.0	11.0	5.5	5.5	P	1.4	1.4	1.2	D, St	40/20/40/0	N	1.8	250	1	MW	150-200	8	0.66	1.40	0.28	1.40
2	34.90	21.0	11.0	5.2	5.5	P	1.4	1.4	1.2	D	40/20/40/0	N	1.9	150	1	MW	150-200	8	0.43	1.05	0.09	1.05
3	34.89	23.0	11.0	6.3	6.3	P	1.4	1.2	1.1	D	10/40/40/10	N	1.0	220-250	2	MW	150-200	4	0.47	0.69	0.20	0.69
4	34.83	40.0	8.5	5.6	6.8	P	1.5	1.5	1.4	D, LWD	20/40/40/0	Y	1.2	300	1	MW	150-275	30	0.39	0.66	0.15	0.89
5	34.46	26.5	20.0	6.0	3.5	P	2.3	1.8	1.2	D, St	40/30/30/0	N	3.0	280-320	4	MW	150-250	10	0.52	0.29	0.20	1.42
6	34.44	35.0	49.5	8.8	9.0	P	2.3	2.3	1.8	D	10/20/60/10	N		150-300	8	MW	150-250	17	0.47	0.41		0.49
7	34.44	35.0	19.0	3.3	8.2	P	2.3	2.0	1.6	D	10/30/60/0	N		150-300	4	MW	150-250	10	0.39	0.61	0.35	1.50
8	34.34	55.0	17.6	3.0	3.0	G	1.3	1.3	1.1	D, LWD	10/40/50/0	Y	0.5	250	1	MW	200	7	0.32	0.28	0.21	0.68
9	33.93	36.0	16.0	14.5	14.5	G	1.5	1.0	0.9	D, LWD	10/40/50/0	Y	1.0	300	1	MW	200	3	0.73	1.21	0.28	1.28
10	33.92	40.0	18.0	15.0	14.5	G	1.5	1.5	1.3	D	40/20/40/0	N	5.0	320	1		None		0.58	0.55	0.31	0.91
11	33.92	40.0	18.0	10.0	14.5	G	1.5	1.4	1.3	D	10/60/30/0	N	3.0	350	2	MW	200-250	4	0.29	0.24	0.13	0.84
12	33.92	40.0	15.5	10.0	10.0	G	1.5	1.5	1.3	D	30/30/40/0	N	2.5	250-350	5	MW	150-250	15	0.51	0.65	0.28	0.86
13	33.66	60.0	11.0	3.0	6.0	Rn	1.0	1.0	0.9	St	10/40/50/0	N	2.0	280	1	MW	200	3	0.32	0.88	0.19	1.41
																RB	200	1				
14	33.61	62.0	13.0	2.8	3.0	G	1.3	1.1	1.1	D	30/40/30/0	N		250	1		None		0.35	0.83	0.35	0.83

Table C4 Detailed Arctic grayling habitat utilization data collected on the Table River mainstem in 1996.

SYSTEM: Table River
LOCATION: Mainstem (26 km to 25 km)
DATE: August 15, 1996
U.T.M.: 10.559811 6070218
MAP SHEET: 93 J 16
CREW: A.L., R.Z./S.K., B.F./ J.F./ D.I.
WATER TEMPERATURE: 12.0 C
REACH #: 2
WATERSHED CODE: 236 - 4508

Site	Loc (km)	Width (m)				Habitat		X-section	Fish	Cover	Substrate	LWD	Distance	Grayling		Other fish presence			Velocity (m/s)			
		Channel	Wetted	Fish	Thalweg	Type	Max. depth (m)	Max depth (m)	depth (m)	Type	f/g/c/b (%)		from LWD (m)	F.L. (mm)	No.	sp./ gen.	F.L. (mm)	No.	Fish	Surface	Bottom	Max
1	25.70	46.0	11.0	5.4	4.3	Rn	1.0	1.0	1.0	D, St	10/50/40/0	N	2.0	200	1	MW	150-200	6	0.59	1.14	0.59	1.19
2	25.64	79.0	19.0	9.0	10.0	Rn/G	1.2	0.9	0.9	St	20/60/20/0	N		200	1	MW	150-250	10	0.57	1.39	0.57	1.39
3	25.64	79.0	19.0	8.4	8.7	Rn/G	1.2	1.0	1.0	St	20/70/10/0	N		270-280	2		None		0.46	1.32	0.46	1.34
4	25.63	79.0	19.0	8.6	7.6	Rn/G	1.2	1.1	1.1	St	10/80/10/0	N		120-330	3	MW	200	6	0.71	0.86	0.21	1.16
5	25.62	79.0	18.7	5.0	2.1	P	2.5	1.5	1.3	D	10/80/10/0	N		300	1		None		0.34	0.33	0.43	0.70
6	25.60	79.0	18.0	7.0	7.5	P	2.5	2.5	1.0	D, LWD	10/40/40/10	Y	0.3	300	1	RB	220	7	0.40	0.29		0.31
7	25.58	79.0	27.8	10.0	13.5	P	2.5	1.7	1.0	D, LWD	10/90/0/0	Y	0.4	360	1	RB	250	2	0.20	0.20	0.14	0.36
8	25.51	48.0	16.0	9.0	9.8	G	1.8	1.0	0.9	None	10/40/40/10	N	3.0	250	1	MW	200	2	0.38	0.87	0.24	0.88
9	25.46	60.0	16.0	12.0	12.0	G	1.8	1.3	1.3	D	20/30/50/0	N	1.5	300	1	MW	100	1	0.25	1.25	0.25	1.28
10	25.42	60.0	18.0	12.0	9.0	G	1.8	1.6	1.3	D	10/10/80/0	N		300-350	2		None		0.25	0.46	0.17	0.58
11	25.41	60.0	21.0	12.6	13.0	G	1.8	1.5	1.3	D	0/10/90/0	N		330	1		None		0.36	0.63	0.31	0.63
12	25.39	50.0	18.8	14.0	13.9	G	1.8	1.4	1.3	D	10/40/30/20	N	2.5	360	1	MW	200-250	5	0.52	0.51	0.41	0.52
																SU	360	2				
13	25.29	28.0	25.0	17.5	14.5	G	2.1	2.1	1.4	D	50/40/10/0	N	5.0	200	1	SU	350-400	20	0.14	0.39	0.14	0.54
14	25.17	39.0	15.0	7.8	9.3	Rn	1.9	1.2	1.1	D	10/80/10/0	N	4.5	320	1		None		0.50	0.96	0.46	1.57
15	25.10	41.0	17.0	5.1	1.8	G	2.5	1.0	1.0	St	20/50/30/0	N		300-360	2		None		0.73	0.93	0.25	1.23
16	25.09	41.0	17.0	7.5	5.0	G	2.5	1.2	1.1	D, St	20/30/50/0	N	5.0	200-300	3	MW	200	4	0.60	0.87	0.48	1.07
17	25.08	41.0	17.0	7.8	5.5	G	2.5	1.7	1.6	D, LWD	20/30/40/10	Y	0.3	360	1		None		0.58	0.36	0.37	0.57
18	25.06	36.0	19.0	9.6	8.5	G	2.5	1.6	1.2	D	20/60/20/0	N		250	2		None		0.23	0.47	0.20	0.57
19	25.02	33.0	27.0	9.9	11.0	G	2.5	1.5	1.5	D	30/60/10/0	N	8.0	250	2	SU	300-360	8	0.24	0.39	0.19	0.43
20	24.94	36.0	33.0	6.2	6.5	G	2.5	1.5	1.4	D	20/70/10/0	N	2.5	200	1	MW	150-250	8	0.38	0.60	0.36	0.68

Table C5. Detailed Arctic grayling habitat utilization data collected on the Table River mainstem in 1996.

SYSTEM: Table River
LOCATION: Mainstem (23 km to 22 km plus 130 m)
DATE: August 21, 1996

U.T.M.: 10 558811 6068319
MAP SHEET: 93 J/16
CREW: A.L./R.Z./S.K./B.F./J.F./D.I.

WATER TEMPERATURE: 9.0 °C
REACH #: 2
WATERSHED CODE: 236 - 4508

Site	Loc. (km)	Width (m)				Habitat		X-section	Fish	Cover	Substrate	LWD	Distance	Grayling		Other fish presence			Velocity (m/s)			
		Channel	Wetted	Fish	Thalweg	Type	Max. depth (m)	Max. depth (m)	depth (m)	Type	f/g/c/b (%)		from LWD (m)	F.L. (mm)	No.	sp./ gen.	F.L. (mm)	No.	Fish	Surface	Bottom	Max
1	22.75	28.5	21.5	11.2	13.6	G/P	3.5	3.0	1.8	D	30/70/0/0	Y	2.0	360	1		None		0.43	0.43	0.34	0.59
2	22.70	41.0	26.0	9.9	4.7	G	2.1	1.5	1.3	D	20/80/20/0	N	6.0	320	1		None		0.41	0.98	0.34	1.03
3	22.68	39.0	26.0	4.7	5.2	G/P	1.9	1.9	1.8	D, St	0/20/80/0	Y	2.0	340	2	MW	200	13	0.36	0.63	0.34	0.71
																SU	300-500	20				
																RB	100-200	1				
4	22.50	65.0	40.0	30.0	28.0	P/D	3.0	2.8	1.9	D, St	20/70/10/0	Y	2.0	280-330	2	MW	200	2	0.34	0.42	0.23	0.61
5	22.25	28.0	25.6	11.1	9.2	Rn	1.6	1.6	1.0	D	30/50/20/0	N	n/a	310	3	MW	300	1	0.90	0.91	0.59	1.36
6	22.10	30.0	29.0	12.7	11.0	Rn/G	3.5	1.6	1.1	D	20/70/10/0	N	n/a	270-300	2	MW	100-200	2	0.44	0.89	0.40	1.35
7	22.09	22.0	21.0	8.0	4.8	G/P	2.5	2.2	1.4	D	40/50/10/0	Y	2.0	360	1	MW	200-300	8	0.14	0.84	0.15	0.85
																RB	200-300	1				
8	21.95	28.0	15.0	11.5	10.0	G/Rn	1.4	1.4	1.1	D, St	40/30/30/0	N	n/a	330	1	MW	100-300	6	0.56	1.00	0.56	1.16
9	21.90	33.0	18.0	5.0	7.0	Rn/P	1.8	1.6	1.5	D, St	10/20/70/0	N	n/a	310	1	MW	100-300	2	0.39	1.46	0.39	1.46
10	21.87	31.0	20.0	13.0	10.0	G/P	1.8	1.8	1.7	D	10/55/35/0	N	5.0	250	1		None		0.40	0.73	0.27	1.19

Table C6. Detailed Arctic grayling habitat utilization data collected on the Table River mainstem in 1996.

SYSTEM: Table River
LOCATION: Mainstem (7 km to 730 m downstream)
DATE: August 9, 1996
U.T.M.: 10.548921.6064020
MAP SHEET: 93 J/16
CREW: A.L./ R.Z./ S.K./ B.F./ J.F./ D.I.
WATER TEMPERATURE: 12.0 °C
REACH #: 2
WATERSHED CODE: 236 - 4508

Site	Loc. (km)	Width (m)				Habitat		X-section	Fish	Cover	Substrate	LWD	Distance	Grayling		Other fish presence			Velocity (m/s)			
		Channel	Wetted	Fish	Thalweg	Type	Max. depth (m)	Max. depth (m)	depth (m)	Type	f/g/c/b (%)		from LWD (m)	F.L. (mm)	No	sp./ gen.	F.L. (mm)	No	Fish	Surface	Bottom	Max
1	6.76	46.0	25.0	11.5	13.0	G	1.8	1.3	1.2	D, LWD	20/20/60/0	Y	0.5	250	1		None		0.28	0.32	0.26	0.96
2	6.76	46.0	25.0	12.0	13.0	G	1.8	1.3	1.2	D, LWD	20/20/60/0	Y	1.0	250	1		None		0.28	0.32	0.26	0.96
3	6.41	40.0	21.0	11.0	7.0	G	3.0	1.0	1.0	None	10/30/60/0	N		200	1	MW	70-270	3	0.35	0.74	0.27	0.65
4	6.27	48.0	18.0	11.0	13.5	G	1.9	1.6	1.1	D, LWD	40/40/20/0	Y	1.0	200	1	MW	170	2	0.60	0.75	0.32	0.52

Key for the detailed 1996 Arctic grayling habitat utilization data tables (C3-C6)

Site	Location (km)	Width (m)				Habitat		X-section	Fish	Cover	Substrate	LWD	Distance	Grayling		Other fish presence			Velocity (m/s)			
		Channel	Wetted	Fish	Thalweg	Type	Max. depth (m)	Max. depth (m)	depth (m)	Type	f/g/c/b (%)		from LWD (m)	F.L. (mm)	No	spp.	F.L. (mm)	No	Fish	Surface	Bottom	Max
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15		16			17			

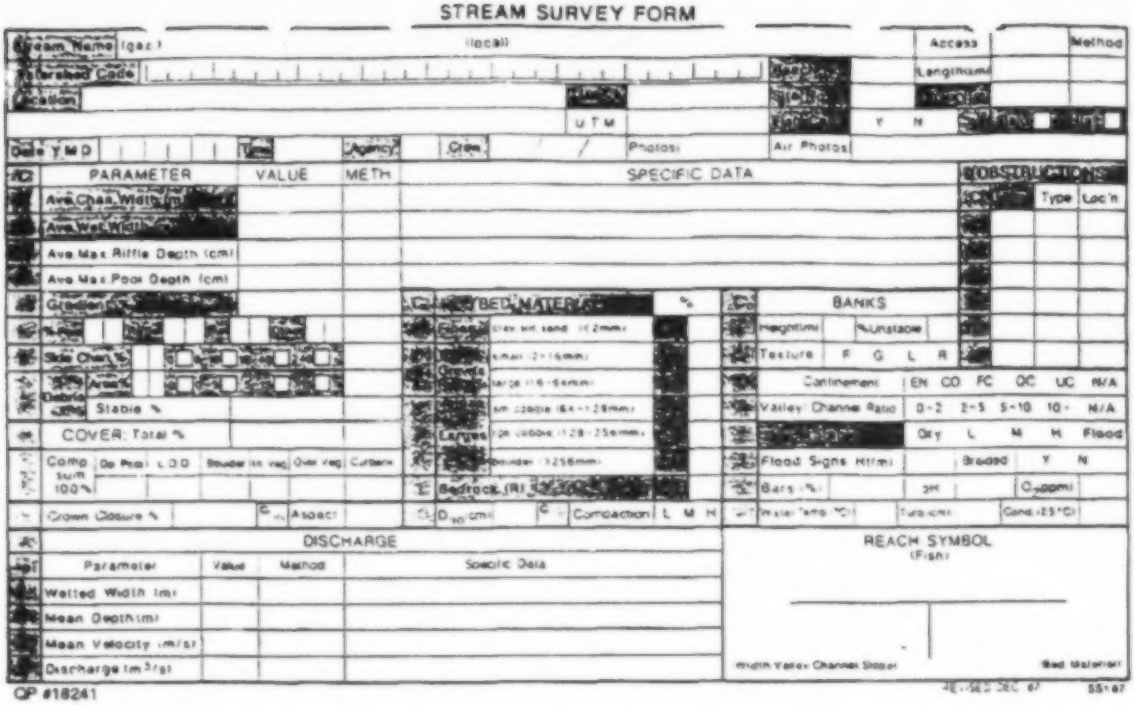
1) SITE NUMBER - indicates each site where grayling were found within the general area surveyed.
2) LOCATION (km) - indicates the exact kilometer location where grayling were found and measurments were taken.
3) CHANNEL WIDTH - channel width measured at each site.
4) WETTED WIDTH - wetted width measured at each site.
5) FISH WIDTH - distance measured from the grayling to the left bank.
6) THALWEG WIDTH - distance measured from the centre of the thalweg to the left bank.
7) HABITAT TYPE - habitat type in which the grayling was found (P=pool, G=glide, Rn=run).
8) HABITAT MAX. DEPTH - maximum depth of the habitat in which the grayling was found.
9) X-SECTION MAX. DEPTH - maximum depth of the cross-section of the river at the point where the grayling was found.
10) FISH DEPTH - water depth at the exact location the grayling was found.
11) COVER TYPE - type of cover present at the location where the grayling was found.
12) SUBSTRATE - percentage of each type streambed substrate present at the grayling location (f=fines, g=gravels, c=cobbles, and b=boulder).
13) LWD - presence or absence of large woody debris that provides cover for the grayling.
14) DISTANCE FROM LWD - distance from the grayling to the large woody debris that can provide cover.
15) GRAYLING F.L. AND NO. - the number of grayling present at each site and their fork length(s).
16) OTHER FISH PRESENCE - indicates the species/genera of other fish present, the numbers of each species/genus and their fork lengths.
17) VELOCITY - water velocity measurements taken at the exact location of the grayling, at the surface, at the stream bottom, and where the velocity was at its maximum in the habitat unit where the grayling was found.

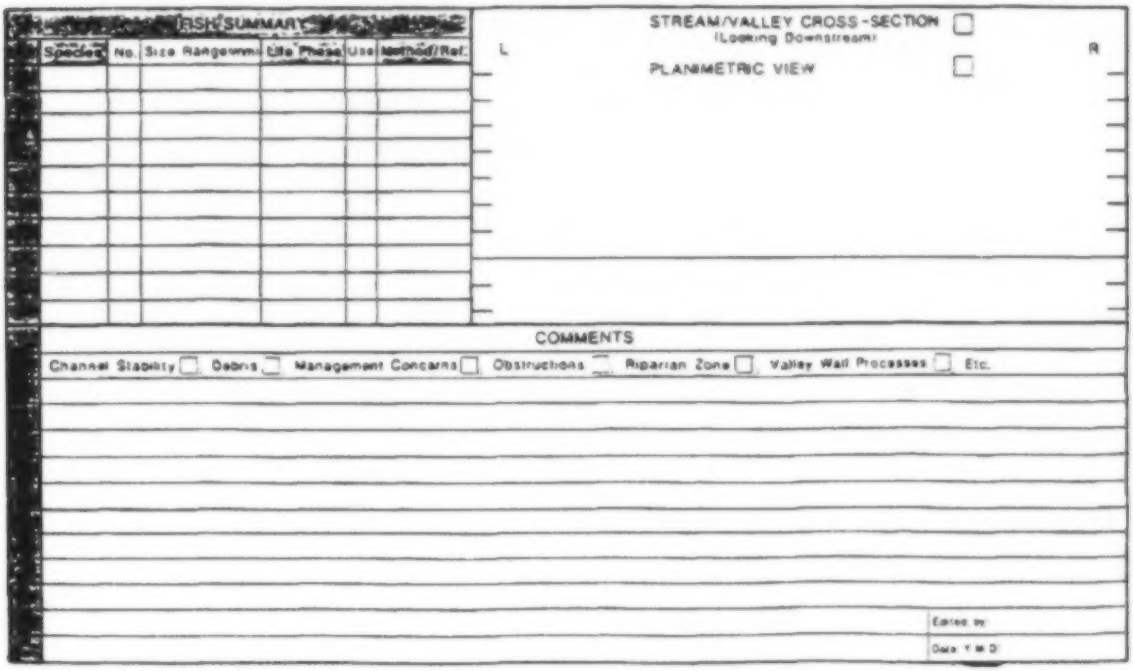
APPENDIX D

Stream Survey, Fish Habitat Assessment, and
Arctic Grayling Habitat Utilization Forms

NAD 83 Universal Transverse Mercator (UTM)
Coordinates for Survey Sites

DFO / MOE
STREAM SURVEY FORM





Reconnaissance Level Stream Survey Data Collection Form.
For definitions of all parameters on this form, refer to the Lake and Stream Inventory - Standards and Procedures, Draft 1993.

Level 1 Fish Habitat Assessment Data Collection Form

STREAM: REACH: DATE/TIME: CREW:

LOCATION: W.T. =

T	L	WW	CW	XO	MD	RC	EL	RS	RN	SP	DAD	DS	SS	F	P	A	DP	LWD	SWB	BLD	CBR	OH	CC	C
																								1
																								2
																								3
																								4
																								5
																								6
																								7
																								8
																								9
																								10
																								11
																								12
																								13

COMMENTS

1. LWD-
2. LWD-
3. LWD-
4. LWD-
5. LWD-
6. LWD-
7. LWD-
8. LWD-
9. LWD-
10. LWD-
11. LWD-
12. LWD-
13. LWD-

Parameter Key for the Level 1 Fish Habitat Assessment Data Collection Form

T - habitat type (ie. glide, pool, riffle)
L - length surveyed (m)
WW - wetted stream width (m)
CW - stream channel width (m)
XD - mean stream depth (cm)
MD - maximum depth (m)
RC - riffle crest (cm) - applies only to pools
EL - element (feature that creates the pool)
RS - rise (cm) - element of gradient
RN run (m) - element of gradient
SP - percentage of useable spawning habitat
D90 - substrate diameter that is $\geq$ 90% of the stream substrate
DS - dominant substrate present (ie. gravel, fines)
SS - subdominant substrate present (ie. gravel, fines)
F - percentage of habitat area suitable for rearing fry
P - percentage of habitat area suitable for rearing parr
A - percentage of habitat area suitable for rearing adults
DP - percentage of cover provided by deep pools
LWD - percentage of cover provided by large woody debris
SWD - percentage of cover provided by small woody debris
BLD - percentage of cover provided by boulders
CBK - percentage of cover provided by cutbanks
OH - percentage of cover provided by overhanging vegetation ($\leq$ 1 m above stream)
CC - percentage of crown closure
C - comment code
LWD - count of LWD pieces in three diameter size classes:

1. 10-20 cm
2. 20-50 cm
3. >50cm

Data collection form for Arctic grayling habitat utilization surveys

Location (km)	Date	Width				Habitat Type	Max depth (m)	X-sect max depth (m)	Fish depth (m)	Cover Type	% Substrate f/g/c/b	LWD	Distance from LWD (m)	Grayling F.L. (cm)	Other fish present sp/size/#	Velocity (m/s)			X-sect max vel (m/s)	Comments
		Channel (m)	Wetted (m)	Fish (m)	Thalweg (m)											fish	surface	bottom		
1	2			3	4	5	6	7	8	9	10	11	12	13	14	15				

1) Location - river kilometer
2) Date - of survey
3) Width (fish) - distance from fish to left bank, facing upstream
4) Width (thalweg) - distance from thalweg to left bank, facing upstream
5) Habitat type - Pool, Glide, Run, Debris jam, Pool tail out, or combinations
6) Maximum depth in habitat unit
7) Cross-section depth of the habitat unit
8) Depth of fish
9) Cover type - LWD, boulders, depth, surface turbulence, undercut banks, overhanging vegetation
10) % Substrate - percent fines (f), gravels (g), cobbles (c), and boulders (b) in the habitat unit
11) LWD - does it provide cover (Y/N)
12) Distance from grayling to LWD
13) Fork length of the grayling
14) Species, size (fork length), and number of other fish species present
15) Velocity at the location of the fish, at the surface, at the bottom, and in the area of maximum velocity in the habitat unit